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Report of the Chief of the Forest Service, 1962

United States Department of Agriculture

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U.S. Department of Agriculture
Forest Service,
Washington, D.C., May 1, 1693.

Hon. Orville L. Freeman,
Secretary of Agriculture.

Dear Mr. Secretary:

It is my privilege to present to you this annual report of Forest Service activities in 1962.

Greater momentum was evident during the year in forestry and related resource conservation. Your advocacy of multiple use and recreation on private lands has added to the momentum.

The renewed drive in Rural Areas Development has brought forestry a new challenge, an awakening opportunity. It has focused attention on the forest lands of the Nation and particularly on the small forest properties and the part they can play in helping sustain the family farm and improve less-developed communities.

Resources of the National Forests—the timber, outdoor recreation, range, water, and wildlife—provided benefits to more and more American people, under multiple use and sustained yield.

Forestry research advanced many aspects of forestry and is continuing to work on unsolved problems, seeking keys to further progress.

In accelerating the Nation's natural resource work, your support and leadership are appreciated by the staff of the Forest Service.

Sincerely yours,

Edward P. Cliff

Edward P. Cliff
Chief, Forest Service.

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This report covers calendar year activities unless otherwise identified. Where records are on a fiscal year basis, they are so reported.

Issued July 1963

Report of the Chief of the Forest Service, 1962

Introduction—Highlights

Significant and steady progress highlighted the nationwide forestry picture in 1962.

The Forest Service made many encouraging advances in carrying out its three major responsibilities—managing National Forests and National Grasslands, State and private cooperation, and forestry research. More constructive programs and more intense activities now are underway than have ever been in the past. But more needs to be done in some fields, such as the management of small private forest holdings.

Public understanding of forests and resource conservation is being increased gradually. Each year, more individuals and groups take an active interest in National Forests, conservation, and forestry in general. One result of this may be to generate more problems with conflicting interests. But the more lasting impact must surely be a net gain for the resources—in better appreciation of them, better protection, and faster development of their capacity to serve all the American people.

These are some of the accomplishments of the Forest Service in 1962:

The Forestry Opportunity in RAD.—Under the Department's Rural Areas Development Program, the Forest Service moved on many fronts to make forests, with their multiple uses, contribute wherever possible to renewal of rural communities. Actually, all Forest Service management activities contribute either directly or indirectly to the improvement of rural areas. This is particularly true of cooperative and research programs. The contribution is equally direct with the management and improvement of National Forest resources.

This normal Forest Service work has been helping the economy of local communities for many years. But the new emphasis on building up less-developed communities is having a beneficial effect. The spotlight has been thrown on the local forest to show what it can do for the community. In this there is a double opportunity: the local community will profit economically by developing and utilizing all of its local forest resources, and the resources will benefit by the greater attention, care, and use.

Tree Planting Drops.—On all lands in 1962, about 1.4 million acres were planted or seeded to trees, requiring about 1.1 billion trees and 210,900 acres of direct seeding. This amounts to approximately six trees for every man, woman, and child in the Nation. Three-fourths of the planting was on private lands, where the need is greatest. Total planting in both 1961 and 1962 was down from the peaks of 1959 and 1960 when some 2 billion trees were planted each year. Largely responsible for this reduction was the completion prior to this year of all conservation reserve planting contracts.

While the past year's planting more than doubles the planting 10 years ago, it doesn't begin to meet the Nation's total planting need. An estimated 70 million acres need to be planted, mainly on the small private woodlands. At the 1962 rate, less than 2 percent of the total job is accomplished annually.

Forest Fire Record: Favorable.—Fire damage on National Forest land was held to an alltime low in 1962—through better detection, the use of aircraft, smokejumpers, fire-retarding chemicals, and improved management of men and methods. Only 85,457 acres burned over in 1962—down from 224,000 the previous year—a 64-percent reduction.

On all lands—public and private—the forest fire score worsened, with approximately 115,000 fires burning over 4 million acres.

While fire still is destroying too much forest, the gradual reduction of fire damage over the past few years is impressive. For example, 10 years ago, in 1952, fires burned 14 million acres; in 1942 it was nearer 30 million acres. This reduction has come about while the use of the forests, with its greater potential for fire, has climbed steeply upward.

However, the past year showed a 31-percent increase in number of man-caused fires on all protected areas, indicating a continuing need for more effort in the prevention programs.

Timber Harvest at Alltime High.—Timber cut from National Forests in calendar year 1962 was the highest in history—9.6 billion board feet. This was an increase of nearly a billion board feet from the 1961 harvest of 8.7 billion, and amounted to more than 15 percent of all the timber harvested in the Nation. Despite depressed lumber industry conditions, timber operations continued at a high level.

Forest Service Receipts—Up.—Total cash receipts in fiscal year 1962 from sale or use of National Forest and National Grassland resources amounted to $114 million. Timber receipts accounted for $106 million of this. Total F.Y. receipts were up $10 million above the 1961 figure. This increase will mean a corresponding increase in the 25 percent share of receipts that is paid to States for support of schools and roads in counties where National Forests are located. In fiscal year 1962, those counties received $25,056,348, which was their share of the net receipts from the National Forests in fiscal year 1961.

Recreation Visits: 113 Million.—Outdoor recreation use of National Forests continued to rise, with the annual increase of some 11 percent, which has been typical of the past 10 years. Total visits reached 113 million in 1962—up from 102 million the previous year.

Visitor Information Services, the new interpretive program to make the National Forests more meaningful to the millions of visitors, was bringing good results. A few visitor information centers were being constructed at heavily used areas. But a larger effort was underway in self-guided nature trails, self-explanatory signs and exhibits, summer employees doing contact work with visitors, and evening illustrated talk or campfire programs in natural amphitheaters.

For example, the Grand Mesa National Forest in Colorado started visitor information services with interpretive specialists on duty 7 days a week during the summer. The Forest had a half million visits during the year. At popular areas during the 6-week summer operation, 14,000 people registered, including some from all 50 States and several foreign countries. Many other forests are making good beginnings with this new effort. Response of visitors to these modest interpretive beginnings has been highly favorable. People want to know more about the forest surroundings, and both forest and people will benefit by this learning process.

The Accelerated Public Works program put many men to work in areas of low employment and at the same time improved National Forest resources for the public—by completing needed timber stand improvement, by building more recreational access roads, campgrounds, picnic tables, lookouts, and the like. Beginning in the late fall, with plans already drawn up, projects were soon underway in 83 National Forests in 35 States and Puerto Rico.

Forestry Research Advances.—Stronger emphasis is being placed on research to help the forest products industry. One result now in the offing is a major new use for southern pine, the manufacture of plywood. The groundwork was laid by research at the Forest Service's Forest Products Laboratory. Plans are underway for industrial development that would use annually some 100 million board feet of this important timber species. In the process, the new use would create 750 new jobs, with an estimated annual product output worth $12 to $15 million.

Fundamental studies continue into the chemistry of wood aimed particularly at unlocking the secrets of lignin, the component that makes up one-third of wood structure. Many chemicals already are derived from wood and have relatively limited markets, but a much greater potential lies in this area of wood research.

New concepts in timber harvest, such as logging by helicopter and transport of pulp chips by pipeline, are being tested experimentally.

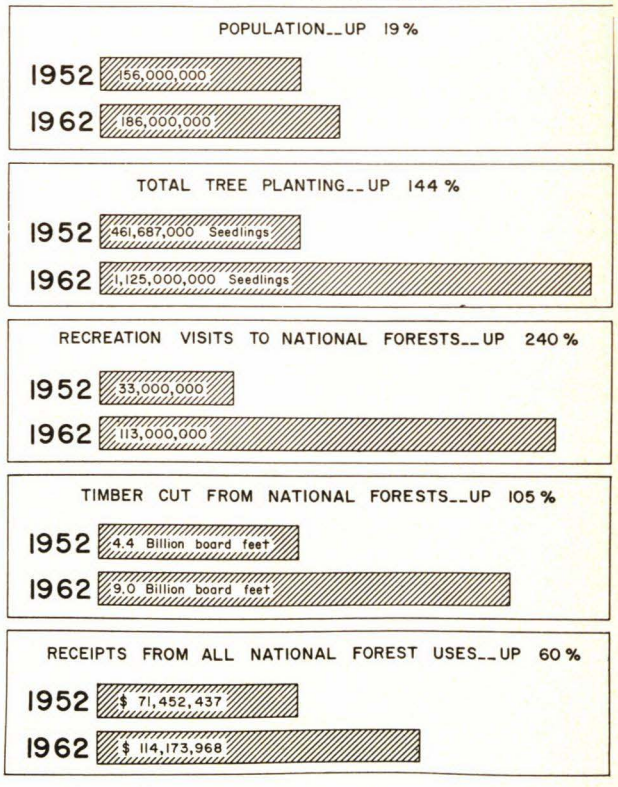
Several million landowners and thousands of forest products firms need better marketing systems and expanded outlets for forest products. Intensified research is underway on these problems with particular emphasis on appraising potential markets and expanding forest industries in less-developed rural areas.

Research in outdoor recreation is establishing principles for better management of this most popular activity, and getting basic facts to guide management decisions.

Within the past 3 years good progress has been made in constructing needed research laboratories or additions to established facilities.

In the battle against forest insects and disease, research is concentrating more on control measures that help reduce the use of chemical insecticides. Gamma irradiation and chemosterilants may serve this purpose by preventing insect reproduction. In addition, many other methods of biological control are being sought.

TEN YEAR TRENDS



Cooperation—State and Private Forestry

This was the year when more people in rural areas of the Nation were taking a new look at their forest resources, particularly the potential on the smaller, private holdings. Many were beginning to see that the resources of forests—the wood, water, outdoor recreation, grazing, and wildlife—may offer the less developed rural community an opportunity heretofore overlooked. Many private forest landowners were realizing that planned multiple use could be profitably applied to the small forest as well as the large.

Forestry's Biggest Opportunity

The Forest Service's regular cooperative programs—aiding States and private forest landowners—continued in forest fire control, forest management, tree planting, forest pest control, flood prevention and river basin programs. At the same time the Department's overall drive in Rural Areas Development (RAD) was giving a new emphasis to this work and pointing up one of forestry's biggest opportunities to date: the chance to show how more intensified forestry can spark economic progress and better living in the less developed rural communities.

Rural Potential

Of 530 million acres of commercial forest land—about a quarter of the country's land area where timber harvest is feasible—half, or 265 million acres, are in some 4.5 million privately owned tracts; these average 59 acres in size. Moreover, holdings of less than 100 acres make up 86 percent of these and 46 percent of the area.

These small forests constitute the most accessible and *potentially* the most productive woodland in the country, and contain one-third of the sawtimber volume or inventory. But unfortunately they are in the poorest condition. This is so chiefly because on them occur the highest proportion of fires, much haphazard timber cutting, and too often, no management at all. As a result, many of these acres produce only one-third to one-half of their potential.

Almost all these 265 million acres are in rural America. About half are owned by farmers; the other half by nonfarmers, such as schoolteachers, bankers, local merchants, and housewives.

RAD and the Forest

More and better timber from this land is therefore one objective in the Department of Agriculture's drive for rural resurgence. The other objectives for a rural comeback can be stated as: More rural prosperity, less farm surplus, and more recreation enterprise.

Ground gained in any one of these objectives means ground gained in at least one of the others.

Opportunities in Recreation

Not only is there much rural land available for recreation development, but there is also a rapidly growing need for outdoor recreation. In some areas it is critical; the Northeast, for instance, has a fourth of the population but only 4 percent of the publicly owned recreation acreage of the 48 contiguous States. What's more, rural privately owned lands are much closer to urban population centers than are the public lands. There are of course the commercial resort lands; but these don't provide enough recreational space now, and there is an upward spiraling of more and more people with more and more leisure time and income.

In 1948, tourists spent $21,610,000 in 31 counties in the Missouri Ozarks; in 1960, more than $72 million.

In 20 years from 1939 to 1959, the American Recreation Society says, there has been a sharp rise in money spent for leisure equipment and services, the annual recreation expenditures increasing from $4 billion to almost $20 billion.

The Past: Sample of the Future

Instances of what has been done provide much of the promise for what can be done. Here are three among the many instances listed in a new Department booklet, "Rural Recreation, A new family-farm business":

Owners of a farm in the East, engaged in dairy farming, are now mainly interested in maple products, Christmas trees, and deer hunters. Recently the hunters have been returning to the farm with their families for summer vacations.

Another eastern farmer "entered the ski-slope business as a sideline to his apple orchards. He is not sure any more which is his sideline. He built his first slopes on idle land and land occupied by low-value woods. Now he is taking out some apple trees to make room for additional skiing facilities."

In the West, "a part-time farmer and logger decided to develop about 20 acres of his 150-acre woodland as a park for commercial recreation rather than clearcut it for logs. He constructed two 3-acre ponds with his bulldozer and stocked them with rainbow trout, bass, catfish, and bullfrogs."

One County and RAD

The people of Webster County, W. Va., a county 95 percent forested, can show how their RAD program succeeded through skillful management of both recreation and timber resources.

They saw their county decline. By 1960, more than 4,000 persons had left during the preceding 10 years. They organized for community-wide action.

Now they have a woodworking plant in Webster Springs, employing 80 local citizens, and two other new industries—all told employing 310 persons. Also, there are two new developments which cater to tourist camping and picnicking.

Technical Action Panels

With such cases in mind, the Forest Service named an official representative to the RAD technical action panels in all States and Puerto Rico, and these representatives have made recommendations on more than 200 county and community development plans.

More Prosperity; Less Surplus

All these instances mean more rural prosperity and eventually a reduction of surplus crops.

The Planning and Industrial Development Board of Alabama reports that 100 new industrial workers means: 338 more people, 117 more households, $749,000 more personal income a year, $343,000 more in bank deposits, $457,000 more retail sales a year, and 55 more schoolchildren.

Such revitalization means a lot to rural dwellers, including the farmers who comprise 7 million in this country's working force.

Per capita income of farm population averaged about $1,400 ($900 from the farm and $500 from other sources). This includes Government payments of about $100. Nonfarmer per capita income averaged $2,350.

Minus 51 Million Acres

It is anticipated that much of the farm overproduction can be reduced by shifting land from crops to grass and trees. Secretary of Agriculture Orville L. Freeman said:

"The best projections we have indicate that in 1980 the food and fiber needs of a population of 245 million people can be met by production from 407 million acres of cropland, which is 51 million acres less than the 458 million acres we classify as cropland today. The urgent problem, which requires immediate attention, is to find new productive uses for cropland."

Reasons for surplus are many. For example: One hour of farm labor produces more than 4 times as much food and other crops as it did in 1919–21, and crop production is 70 percent higher per acre.

In many ways the Forest Service's regular programs—in cooperation, National Forest management, and forestry research—contribute to the improvement of rural America, and thus are a strong factor in the Rural Areas Development program.

COOPERATIVE FOREST MANAGEMENT

Aid through Cooperative Forest Management has long been an approach in development of rural areas, and the RAD has been giving it more impetus.

Under the Norris-Doxey Cooperative Farm Forestry Act of 1937, farm foresters assisted only the farm woodland owners. The Cooperative Forest Management Act replaced it in 1950. This 1950 act extended forest management service to all privately owned forests with special emphasis on the 4.5 million small properties.

Small Woodland Owners Helped

Accordingly, the Forest Service works with States on a cost-sharing basis, and the States send their own foresters—farm foresters, service foresters, project foresters, or local foresters, depending on the particular State's designation—to work with woodland owners.

State expenditures for farm foresters last year amounted to $3,034,556, and Federal contribution toward employment and activities of farm foresters came to $2.5 million—all together about $5.5 million as against the $4.5 million the previous year.

As a result, 91,418 owners of small private forests were helped last year, their lands thereby becoming more productive and profitable for timber, recreation, wildlife, and other multiple forest uses and products. Timber harvesting and marketing assistance given those owners led to gross returns of $12.3 million to the owners.

Despite these accomplishments, the cooperative work covered only 4,797,106 acres, or 1.8 percent of the country's small woodland acreage.

More than 8,000 operators of small sawmills and plants processing primary forest products were helped with their woods and plant problems. These accomplishments contributed directly toward the improvement of income opportunities in rural areas.

The program continued to grow. The number of State-employed foresters increased from 593 in 1961 to 638 in 1962, and Hawaii became the 49th State to provide assistance to private forest landowners and processors (under the Cooperative Forest Management Act).

General Forestry Assistance

General Forestry Assistance extends into areas and is available to forest landowners and to forest products processors not reached by other programs. It includes all types of forestry work, particularly highly specialized activities not handled by State forestry organizations.

In 1962, Forest Service technical personnel gave forest management and processing aid to more

than 300 owners and managers of large private and public forests and forest industries. This covered 3.5 million acres of private and industrial forests, 1.4 million acres of State and local public forests, and about a quarter-million acres of forest land under the jurisdiction of the Army, the Navy, and other Federal Departments.

Program accomplishments also included development of more than 50 forestry bulletins and other publications, participation in 89 technical forestry conferences, and a number of special forest resource development and use studies for low-income rural areas.

COOPERATIVE FOREST FIRE CONTROL

Fire, as one of the natural forces that destroy forest life and resources, cuts down potential development, rural and otherwise.

It led, over 50 years ago, to Cooperative Forest Fire Control, a program in which State and Federal foresters and private landowners strive to put under organized fire protection some 444 million acres, or about one-fifth of the United States land area.

95 Percent Coverage

By the end of the year there were roughly 24 million acres still needing protection as against 420 million under protection. Unprotected forest lands add up to a total area greater than the entire (fully protected) State of Maine. The coverage goal of 444 million will change, for several reasons. In Alaska, for example, the acreage under protection and needing protection increases as the State, under the Statehood Act, selects additional Federal land from the public domain for administration under State authority.

Progress has been evident. In a little more than a quarter century from 1936 to 1962, more than 240 million acres of State and private forest lands and nonforest watershed lands went under protection. The newer States in the program—Alaska, Kansas, and Nebraska—are off to a good start.

Records also reflect what the protection has done in the way of saving forest land. Area burned usually has been greater on unprotected land than on protected, even though far more land is under protection. Estimates of the final figures for 1962 show 2.2 million unprotected acres burned, compared with 1.5 million on protected lands. Protected lands cover 17 times the area of unprotected forest land.

Expenditures Show Contrast

Progress also shows up in the greater buildup of State and private expenditures in contrast with the smaller increases in Federal outlays. From fiscal year 1956 to last year, annual total expenditures rose from about $42 to $64 million. A breakdown for that same period shows that State contributions went up from $32.9 to $52.6 million compared with the Federal appropriations, up $2.5 million from $10 to $12.5 million.

Cooperative fire control officials estimate that $90 million is needed for adequate work in extension, intensification of control (reduction of burn acreage), and prevention (reduction in the number of fires, especially man-caused).

The 1962 Fire Record

Although over the years the number of fires and the acreage burned have been reduced steadily, the record for 1962 showed increases, indicating continuing need for strong prevention and suppression measures. From all causes, 104,924 fires occurred on State and privately owned areas, which is an increase of 20,529 fires or 31 percent over 1961. These fires burned approximately 3,768,000 acres, an increase of about 1 million acres or 31 percent over 1961.

Planning for Better Protection

During 1962 the State Foresters collected forest fire statistics on a larger scale. The data will give a more meaningful base on which to base administrative decisions as to prevention, presuppression, and suppression activities and future plans.

Program personnel suggested model fire prevention legislation to the Drafting Committee of the Council of State Governments. Membership has been maintained on the Forest Committee and Rural Fire Protection Committee of the National Fire Protection Association.

Assistance was given in the improvement of plans for adequate rural fire defense in the Civil Defense program.

The acquisition by the States of excess Federal firefighting property under the cooperative program continues to be of much help towards improving fire control efforts.

General directions for the nationwide periodic fire-replanning job have been prepared. The job will be done in each of the 50 States by the State Foresters with Forest Service assistance.

COOPERATIVE FOREST FIRE PREVENTION

As successful as the forest fire prevention campaigns have been, the need remains for still greater effort.

Smokey Bear's role in the nationwide Cooperative Forest Fire Prevention program (CFFP) has not ended, and he needs continued support in the campaign against man-caused fires as last year's total shows. Man-caused fires increased by 32 percent in 1962.

Since the start of the CFFP program, however, the number of fires has been cut in half, from an average of more than 200,000 annually to below 100,000 per year for 5 years through 1961. (The average is 87.6 thousand, with a high of 97,418 in 1959 and a low of 77,733 in 1956.

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Fire Danger Goes Up

Past success therefore points up the need for the program, as does mounting woods activity, which creates more potential fire danger. Since the start of the program, for instance, the number of recreation visits to the forests has jumped manyfold. In the National Forests alone, for the same period, there has been a 500-percent increase in visits.

CFFP in Its 21st Year

The Smokey Bear program (CFFP), sponsored by The Advertising Council, Inc., and conducted by the Association of State Foresters, completed its 21st consecutive year. Highlights included:

(1) An operating plan expanding program activities between the Forest Service and the Canadian Forestry Association approved in December 1962.

(2) Instructions for a comprehensive forest fire prevention awards program, following approval by the CFFP Executive Committee and The Advertising Council.

(3) Initial printing of 76,000 copies of a new Teachers' Forest Fire Prevention and Conservation Kit. This item includes standard and special materials to assist teachers of grades 1 to 4 in presenting a classroom forest fire prevention project.

Through the cooperation of the Native Sons and Daughters of the Golden West, a Smokey Bear forest fire prevention float was again a part of the 1962 Pasadena Tournament of Roses parade.

Southern CFFP Emphasis

Because more than half of the Nation's man-caused forest fires occur in the 11 Southern States, there was an increased distribution of regionally oriented materials produced by Liller, Neal, Battle and Lindsey, volunteer advertising agency. These materials are designed to emphasize the loss to the South from incendiary and debris-burning fires. This supplementary campaign, now in its fifth year, has helped decrease the number of man-caused forest fires in the South.

Smokey Royalties Increase

Royalties from the Smokey Bear commercial support program (sale of licensed products) in F.Y. 1962 rose to more than $19,000—up 40 percent over last year's receipts. The larger sum, earmaked for campaign work, was the result of better promotion, new licenses, and new items.

FOREST PEST CONTROL

Storm Damage and Forest Pests

From 1949 to 1952, catastrophic losses of timber in western Oregon and Washington amounted to about 12 billion board feet. This damage was due to hurricane winds that flattened nearly 9 billion board feet of timber and to bark beetles that bred in the down timber and emerged to kill 3 billion board feet more. Much of this damaged timber was salvaged, but a considerable volume was a total loss.

On Columbus Day in 1962, hurricane winds blew down 11 billion board feet of timber in the same States. Wide-scale salvage operations began immediately to use as much wind-damaged timber as possible in order to forestall more losses by bark beetles. Insects are expected to attack wind-thrown trees during 1963 and emerge to kill surrounding green trees after April 1964. The success of present salvage operations on Federal and non-Federal lands will determine the magnitude of subsequent bark beetle losses.

Insect and Disease Control

Destructive forest insects and diseases kill about 7.3 billion board feet of sawtimber each year. In sawtimber they also cause an annual growth loss estimated to be 21.2 billion board feet.

Efforts to reduce this drain were continued by the Forest Service, other Federal land-managing agencies, State and local governments, and timber owners. Detection systems to discover outbreaks were strengthened, and the creation of conditions which prevent attacks was stressed and facilitated in all forest resource-management activities. Insofar as available funds and Federal and State legislation permitted, and where favorable cost-benefit ratios were indicated, vigorous suppression measures were taken against destructive insect or disease outbreaks.

Controlling Insects

A number of major insect outbreaks required intensive suppression. Control actions were undertaken with precautions for the protection of fish and wildlife and in cooperation with the Federal Council on Insect Control and with Federal and State wildlife agencies.

The largest and costliest projects were for suppression of bark beetle outbreaks. More than $4,500,000 was spent to treat 1,897,000 infested trees, stumps, and cull logs. Four species of bark beetles—southern pine, mountain pine, western pine, and Engelmann spruce beetles—caused the most damage.

Losses caused by the southern pine beetle were particularly severe in 1962. Estimates place the loss of southern pine timber in excess of 1 billion board feet—enough to build 100,000 homes. An allout campaign by Federal and State agencies and private owners is being waged to suppress the epidemic.

Approximately 1.2 million acres were aerially sprayed at a cost of about $0.98 per acre to suppress outbreaks of spruce budworm, jack pine budworm, pine tussock moth, hemlock looper, and elm spanworm, the primary species of defoliating insects causing losses in 1962.

Cooperative surveys were continued in Oregon and Washington to track down infestations of the

European pine shoot moth, discovered in those States in 1959 and 1960. Except for an infestation in native lodgepole pine near Aberdeen, Wash., this destructive pest has been found only in ornamentals and nursery stock in these States. Satisfactory methyl bromide fumigation techniques were developed for treating ornamentals and nursery stock.

Controlling Diseases

The long-standing program to keep losses from white pine blister rust to tolerable levels was continued on all land bearing commercially and esthetically important white pines. In the eastern United States, where 8.6 million acres have been selected for white pine management, the disease is largely under control as the result of previous work; remaining work involves keeping it that way by a maintenance program. In the western United States control is still not established on 78 percent of the 2.8 million acres selected for white pine management. Major control effort in 1962 was concentrated in the West, especially in north Idaho, where white pine lumber production is vital to the economy.

Three Million Acres Treated

Over 3 million acres of white pine land and surrounding protection zones received blister rust control treatment in 1962. Work to establish control involved: Systematically surveying 1.5 million acres, removing 7.1 million ribes plants (currants and gooseberries from which the disease spreads to the pines) from 136,000 acres, and treating 13 million western white pine trees on 95,000 acres with antibiotic fungicides. Work to maintain control previously established included systematic inspection by sampling 1.6 million acres and removing 1.5 million ribes plants from 56,000 acres.

Sixty-eight percent of these accomplishments were on State and private land in 22 States, where control costs were shared by Federal, State and local governments, and private owners. The remaining 32 percent was on federally administered land in 31 National Forests, 11 National Parks, 4 Indian Reservations, and 2 Bureau of Land Management districts.

In all of these activities, the Forest Service provided coordination and technical aid. In addition, the Forest Service administered all control activities on National Forests, continued economic studies in the East and in north Idaho to determine cost-benefit ratios in white pine blister rust control, and continued a tree-breeding program for white pine resistant to blister rust.

Oak Wilt

A cooperative Federal-State program to control oak wilt, a killing disease of oaks in the Midwest and East, was continued. Six States—Pennsylvania, Virginia, West Virginia, Kentucky, North Carolina, and Arkansas—participated. In 1962 about 43 million acres were aerially searched for trees infected with the disease. A total of 4,389 such trees were located and treated.

Dwarfmistletoe

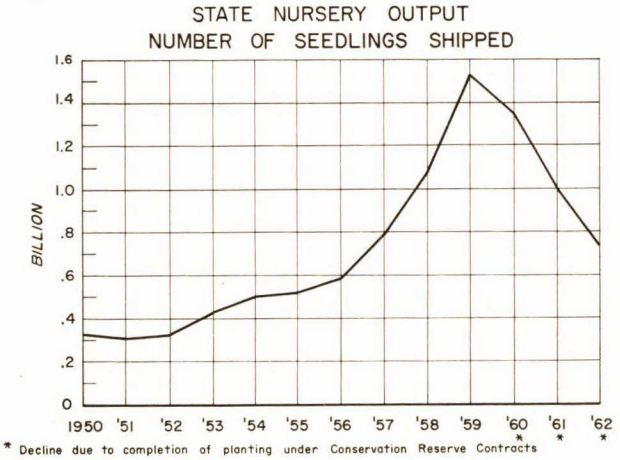
As in past years, control of dwarfmistletoe was continued mostly through timber sales and stand improvement practices. Control was brought about by survey of 105,000 acres and treatment of 1,400 acres where control by sales and stand improvement were not feasible.

TREE PLANTING

With the completion in 1961 of all but a few thousand acres of the soil bank conservation reserve contract planting, tree planting in 1962 was down to a more normal base. On all classes of forest and windbarrier land, tree planting (including seeding) amounted to 1,402,115 acres for the year. Of this total, 75 percent was on private land, 18 percent on Federal, and 7 percent on other public land. This is an overall reduction of 394,091 acres, or 22 percent less than 1961. However, it is 486,687 acres or 53 percent more than the acreage planted in 1956, the year before planting on soil bank conservation reserve contract land started.

Direct Seeding

Direct seeding as a reforestation practice increased substantially again in 1962 to a total of 210,907 acres. Most of this is on public land and industrially owned land, because of the special adaptability of this procedure to the larger holdings.



The capacity of nurseries producing forest and windbarrier tree planting stock is adequate to support a planting program of close to double the 1962 rate. Some of this capacity will disappear during the current period of nonuse as the various corporate owners of forest land adjust their plans

and as States and commercial nurserymen convert their smaller or otherwise less productive nurseries to other uses. Capital expenditure will continue to be necessary to apply improved techniques and to maintain reasonably efficient nursery production.

Future Job Dwarfs Past

The basic statistics of the National Inventory of Soil and Water Conservation Needs—published in USDA Statistical Bulletin 307, August 1962—show a need for planting an equivalent of about 70 million acres of forest and windbarrier planting on all classes of non-Federal land. This is a big job which dwarfs to a considerable degree the 1,152,000 acres planted on non-Federal land in 1962. A substantial increase in the rate of tree planting on privately owned land in particular is essential to meet important soil and water conservation needs and the needs for productive woodlands for industrial wood production, recreation, and wildlife uses.

The State Foresters in cooperation with the Forest Service distributed to landowners 725,790,000 forest or windbarrier trees at an average price of $6.85 per thousand in fiscal year 1962. All but 3 million of these trees were produced in State nurseries. This program was active in 48 States and Puerto Rico.

The Forest Service provided financial assistance to 24 State Foresters in the reforestation of commercial forest land for industrial wood production. Under this program approximately 94,000 acres of non-Federal public and 3,300 acres of private land was planted, seeded, or treated to encourage natural regeneration.

FLOOD PREVENTION AND RIVER BASIN PROGRAMS

The Forest Service promotes flood prevention and watershed protection under several programs: the Flood Control Act of 1944, pilot watershed projects authorized in 1954, and the Small Watershed Program under Public Law 83–566, as amended. In assisting with, planning, or carrying out forestry measures under these programs, the Forest Service cooperates with local project sponsors, the Soil Conservation Service, State Foresters, and other Federal, State and local agencies. It acts directly to apply emergency flood prevention measures on non-Federal and National Forest lands. The Forest Service also cooperates with other Federal agencies and State Governments in the conduct of comprehensive river basin studies for the development of water and related land resources.

The Division of Flood Prevention and River Basin Planning represented the Forest Service on the USDA Advisory Committee to the ad hoc Water Resource Council's committee on revision of policies and procedures for conduct and evaluation of water resource development programs. The Council's committee submitted a statement of policies and procedures that were approved by the President and published as Senate Document 97 in May 1962.

Flood Prevention Projects

Work continued on the forestry and fire control aspects of seven flood prevention projects authorized under the Flood Control Act of 1944. During the year, 43.4 million trees were planted on eroding flood source lands. This planting, 78 percent of which was on the Yazoo-Little Tallahatchie projects in Mississippi, was done through the combined efforts of the Forest Service, Soil Conservation Service, Agricultural Stabilization and Conservation Service, Corps of Engineers, local soil and water conservation districts, and landowners.

Technical forestry assistance was given to 8,638 landowners and operators in correcting undesirable watershed conditions on private land. This action led to improved forest management on 45,090 acres and the stabilization of 20 miles of sediment-producing logging roads.

Fire prevention and control was strengthened on 90,000 acres of National Forest and private lands within the project areas by the construction of 22 miles of fire roads and two additional buildings for fire crews and equipment on critical watersheds.

Other flood control measures included construction of 47 channel barriers to stabilize stream channels and adjacent slopes on the Los Angeles River Project in California, and construction of 32 channel control structures—stabilizing walls, groins, and weirs—on the George Washington National Forest portion of the North River, a part of the Potomac River Project in Virginia.

Pilot Projects

The Watershed Demonstration or Pilot program on 58 small watersheds authorized in 1953 is completed except for 3 projects. Sixty landowners received technical forestry assistance in 1962; trees were planted on 566 acres and 1,491 acres were put under management plans.

Improving Small Watersheds (P.L. 566)

Watershed protection and flood prevention projects are started under the Watershed Protection and Flood Prevention program of 1954 (P.L. 566) by local groups which receive planning, technical, and installation assistance from Federal and State agencies under the general leadership of the Soil Conservation Service.

During 1962 the Forest Service worked with State Foresters, the Soil Conservation Service, and local sponsors in planning Watershed Protection and Flood Prevention improvements on 273 small watersheds. Work plans were approved and installations authorized on 77 new projects; 37 of these include accelerated programs for improvement of forest lands.

Forestry measures were installed on 150 projects. More than 20 million trees were planted on 13,865 acres of privately owned land. Technical forestry assistance for watershed improvement was given to 1,991 landowners. Protection from forest fire was extended or strengthened on 560,000 acres. Other watershed improvements included hydrologic stand improvement and protection from grazing damage on 54,300 acres.

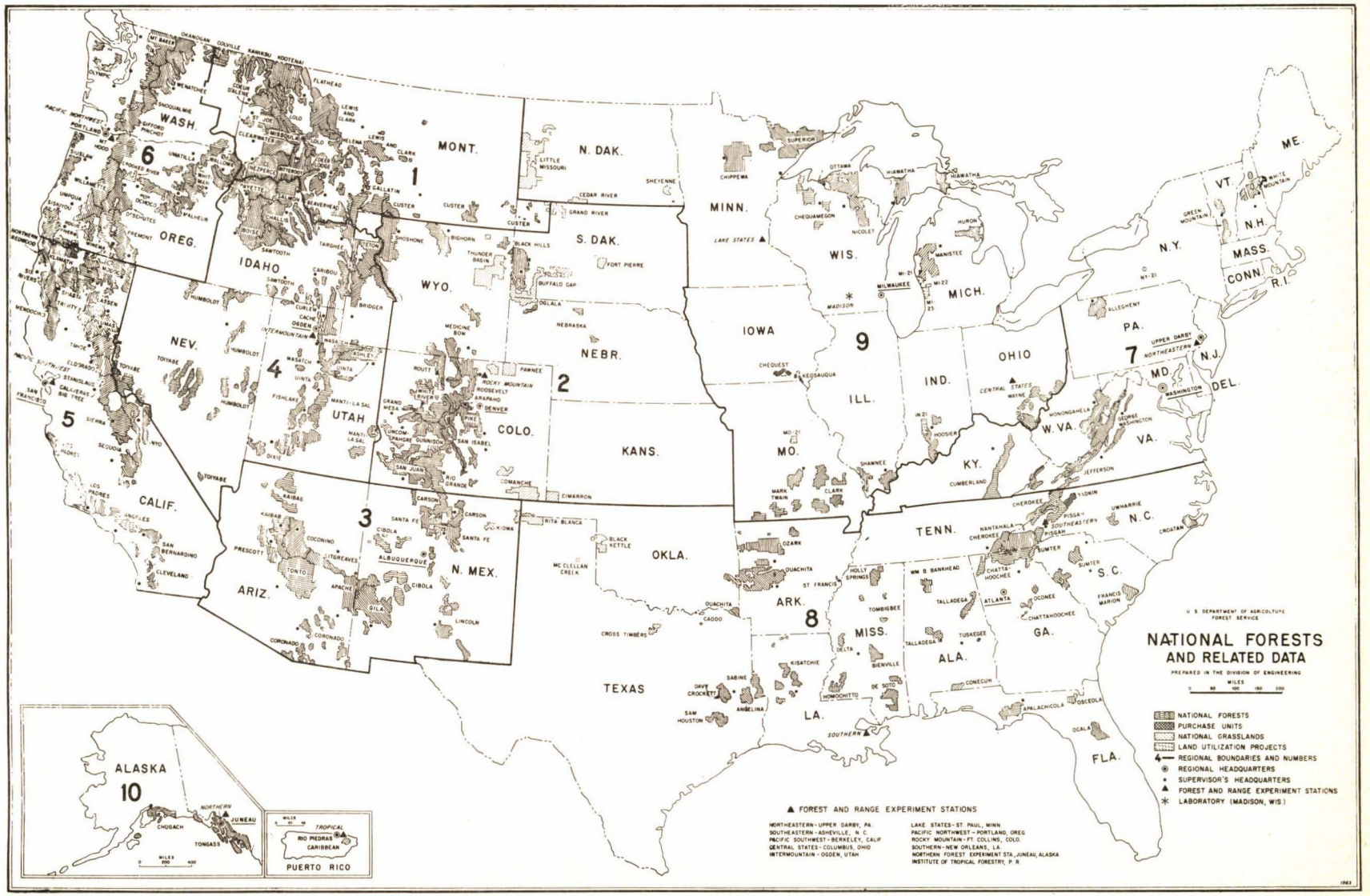
Public Law 566 improvements on National Forest lands included revegetation on 1,200 acres by grass seeding and tree planting; chiseling and contour furrowing on 26,100 acres of critical flood and sediment source areas; stabilization of 210 miles of eroding gullies; and 20 miles of roadside erosion control.

Emergency Flood Prevention

Emergency watershed treatment measures were applied on nine recently burned-over areas within and adjoining the National Forests in southern California during the year. This work was done to minimize downstream hazards to life and property caused by destruction of vegetative cover on the watersheds. About 11,520 acres were seeded to quick-growing grass and mustard by airplane or helicopter to provide an immediate protective cover over most of the burned area. The State, counties, landowners, and railroads cooperated in these efforts.

River Basin Surveys

The Forest Service cooperated with the Soil Conservation Service, the Economic Research Service, and State agencies concerned in studies of water and related land resources in many river basins throughout the country. These studies included cooperative surveys with the Corps of Engineers and the Bureau of Reclamation in 11 river basins. The Forest Service cooperated with State water resource agencies in beginning statewide water resource inventories and problem analyses in four States, and with special U.S. Study Commissions for the Southeast and Texas River Basins. Surveys were completed on eight basins and subbasins: one in Colorado; two in Nevada; two in Oregon; the Potomac River in Maryland, West Virginia, and Virginia; the Tombigbee in Mississippi and Alabama; and the U.S. Study Commission survey of Texas rivers. New studies were begun in Missouri, Nebraska, South Dakota, North Dakota, Oklahoma, and for the entire Ohio River Basin.


NATIONAL FORESTS AND RELATED DATA
PREPARED IN THE DIVISION OF ENGINEERING
U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
NATIONAL FORESTS
PURCHASE UNITS
NATIONAL GRASSLANDS
LAND UTILIZATION PROJECTS
REGIONAL BOUNDARIES AND NUMBERS
REGIONAL HEADQUARTERS
SUPERVISOR'S HEADQUARTERS
FOREST AND RANGE EXPERIMENT STATIONS
LABORATORY (MADISON, WIS.)
▲ FOREST AND RANGE EXPERIMENT STATIONS
NORTHEASTERN - UPPER DARBY, PA.
SOUTHEASTERN - ASHEVILLE, N. C.
PACIFIC SOUTHWEST - BERKELEY, CALIF.
CENTRAL STATES - COLUMBUS, OHIO
INTERMOUNTAIN - OGDEN, UTAH
LAKE STATES - ST. PAUL, MINN.
PACIFIC NORTHWEST - PORTLAND, OREG.
ROCKY MOUNTAIN - FT. COLLINS, COLO.
SOUTHERN - NEW ORLEANS, LA.
NORTHERN FOREST EXPERIMENT STA., JUNEAU, ALASKA
INSTITUTE OF TROPICAL FORESTRY, P. R.
ALASKA
10
PUERTO RICO
TROPICAL
RIO PIEDRAS
CARIBBEAN
1963

National Forest Management and Protection

This was a year of marked progress on the Nation's 154 National Forests and 19 National Grasslands. Each year records are broken as a matter of course, only to serve as new marks to be surpassed in the succeeding year. Steadily the pace is quickening in all activities related to the management and protection of the National Forest System, which includes 186 million acres in 41 States. The accomplishments of 1962 affected every resource and all aspects of protection and development, translating into action the twin guiding principles of National Forest administration: sustained yield production and multiple use management.

No one need look far to see what compels intensified activity year after year. National Forest resources are in constantly growing demand—a demand generated by a growing population with more wealth, leisure, and mobility. In the years to come the National Forests will be required to produce more and more water, timber, forage, wildlife, and outdoor recreation; demands will also grow for many special uses such as utility rights-of-way, group camp facilities, highways, airfields, and reservoirs.

One Acre Each—But Not Any More

On May 16 the need for stronger management was brought home dramatically; for 11 seconds the 186,160,311 National Forest acres exactly equaled the estimated 186,160,311 men, women, and children in the United States. Since that moment, National Forest acreage has changed very little, but by December 31 the population had increased by another 1,132,000 people. The National Forests belong to all these Americans; through skillful management they must continue to serve them all for the greatest public good.

Development Program Advances

The Forest Service is meeting these challenges with a carefully prepared plan, the *Development Program for the National Forests*, which President Kennedy presented to Congress in September 1961. This is a blueprint for action to meet the public needs now and in the year 1972, with specific goals in physical improvements, annual operations, and maintenance. The program also points toward the demands expected in the not-too-distant year 2000.

Accelerated Public Works

The development program, already well underway, got an additional boost late in 1962 when on September 16 President Kennedy signed into law the Accelerated Public Works program to stimulate the economy and relieve unemployment in areas of economic distress. Initially $15 million was allocated to the Department of Agriculture to get work started immediately on 83 National Forests in 35 States. Work has since been continued with subsequent allocations for National Forests, research, and State and private forestry programs. In total $31.0 million was allocated for National Forests and Research, and $1.6 million for State and private forestry.

Advance preparations and the plans embodied in the development program enabled the Forest Service to start work immediately when the allocation was made. Funds were received on Friday, October 26, and by Monday the 29th about 1,000 men were on the job. By November 2, 3,500 men had been hired; and a month later the total number of unemployed who had found jobs on the National Forests was about 9,100. These men were engaged in development of recreation facilities, timber stand improvements, road construction and improvement, and similar capital investment projects scheduled as part of the regular development plans for the respective National Forests.

In summary, as a result of the Accelerated Public Works projects on the National Forests the following accomplishments are anticipated from the total allocation:

Reforestation	8,000 acres
Timber stand improvement	194,000 acres
Camp and picnic area rehabilitation	2,000 family units
Camp and picnic area construction	4,200 family units
Range revegetation	2,400 acres
Erosion control	14,100 acres
Insect control	15,000 acres
Road construction and reconstruction	1,750 miles
Trail construction and reconstruction	270 miles

Construction of 550 range improvements, 50 research facilities, 78 residences, 40 offices, and 265 other buildings.

WILDLIFE MANAGEMENT

The wildlife management program of the Forest Service aims at developing high-quality wildlife habitats for the benefit of those who seek wildlife in a natural environment—sportsmen, nature lovers, students, scientists, and many others who merely enjoy visiting the National Forests and Grasslands. Protection of critical habitat areas to save and restore vanishing species receives special attention. Increasing development of all re-

sources requires that wildlife management efforts keep pace with new demands; the Forest Service does this through cooperation with State fish and game authorities, coordination of wildlife with other resource management, and direct habitat improvement projects.

Wildlife—A Sustained-Yield Crop

The importance of National Forest fish and game was amply demonstrated by the 24.5 million visits by hunters and fishermen. Use of the forests by sportsmen increased by more than 10 percent over 1961. Such heavy use indicates not only ready access to the Nation's largest system of unposted hunting and fishing land and waters, but also the success that sportsmen enjoy.

Hunters accounted for 8.5 million visits and bagged an estimated 700,000 big-game animals and many more small-game animals, upland game birds, and waterfowl. The big-game harvest was about 15 percent of the estimated population of 4,600,000 big-game animals that live on National Forest lands.

Fishermen accounted for 16 million visits to the National Forests, where they tried their luck in the 81,000 miles of fishing streams and nearly 2 million acres of lakes and reservoirs.

Improving Habitat

Much of the National Forest wildlife habitat is improved by coordinating other resource activities in ways that will benefit wildlife. This may be done by leaving den or mast trees when timber is harvested, making timber cuts that stimulate wildlife food plants, and planning water developments, fencing, roads, and other improvements with consideration for wildlife needs.

Many opportunities also exist for direct wildlife habitat improvements, which—though small in area—return large dividends in the capacity of the land to support plentiful game or in the capability of streams and lakes to maintain a good supply of fish. Listed below are the direct habitat projects accomplished during 1962.

1. Revegetation of key wildlife areas through:

Permanent openings	3,285 acres
Prescribed burns	34,213 acres
Seeding and planting	13,647 acres
Release of forage plants	11,231 acres
Fencing key game areas	6,787 acres

2. Small water developments for wildlife:

Ponds, troughs, guzzlers, etc	486 projects

3. Fish stream improvements:

Bank stabilization and barrier removal	105 miles
Stream improvement structures	40 miles
Fencing stream channels	14 miles

4. Lake improvements for fish:

New lakes constructed	188 acres
Water level and bank stabilization	140 acres
Debris and rough fish removal	132 acres
Aquatic plant control	218 acres

5. Waterfowl lakes constructed 182 acres

6. Access constructed for hunting and fishing:

Trails	142 miles
Roads	110 miles
Parking areas	143 each
Boat ramps	17 each

TIMBER MANAGEMENT

Whether growing or harvesting the crop, Forest Service officers made it a big year in the management of National Forest timber. Timber cut was near the alltime high despite depressed timber markets. Reforestation was just below the record mark set under the Civilian Conservation Corps in 1936, and the calculated annual allowable harvest of timber was increased as a result of better inventories and improvements in the utilization of trees.

Timber Damaged in Northwest Storm

The severe Columbus Day storm in the Pacific Northwest caused widespread timber damage which brought the Departments of Agriculture, Interior, and Commerce, Congressmen, the States, and private industry together in close cooperation. Promptly after the storm President Kennedy directed the three Federal Departments to hold an emergency conference to plan steps necessary for salvage of the more than 11 billion board feet of blown-down timber. The States, private owners, and the Federal Departments have completed a comprehensive survey to determine the location and extent of major areas of damage. Aggressive efforts are going forward to bring about effective salvage operations before the summer of 1964. The Forest Service and other Federal and State agencies have modified timber sale procedures to expedite these efforts.

About 17 percent, or 1.9 billion board feet, of the blowdown was on National Forest land. The greatest proportion of loss—64 percent—was on private lands; 3 percent on State lands; and 16 percent on Federal lands administered by the Bureau of Land Management. Of the total blowdown, an estimated 56 percent was in Oregon and 44 percent in Washington.

Allowable Cut Raised

On December 7 Secretary Freeman announced a net increase of 547 million board feet in allowable cut for 42 National Forests in the Pacific Coast and Intermountain States. This increase was possible because of an acceleration in the regular review and periodic revision of timber management plans and inventories. In all but three Forest Service Regions periodic revision of management plans is on or ahead of schedule, and in those three Regions the inventory and plan review projects will be up to date within the next 2 years. Most of the new plans are based on more precise timber type classification and area determination.

	Thousands of acres		
	As of 1/1/62	*As of 1/1/63*	*Change*
Status of timber management plans:			
Current and based on modern timber inventories	49, 875	67, 200	+17, 325
Extended (more than 10 years old)	5, 639	6, 202	+563
Based on incomplete inventories	17, 087	5, 852	−11, 235
With approved interim cutting rates	20, 367	16, 641	−3, 726
Totals	92, 968	95, 895	+2, 927

Improving and Planting the Crop

Reforestation by planting and seeding increased to 217,792 acres in fiscal year 1962, within 3 percent (5,300 acres) of the alltime record established under the emergency conservation (CCC) program in 1936. There was also substantial progress in the development of new nurseries and the establishment of seed orchards for production of superior seed. Forest Service nurseries now are capable of producing 250 million trees per year, while related seed extraction and processing facilities virtually doubled their capacity to about 3,000 bushels of cones daily.

Fiscal year 1962 accomplishments in reforestation and timber stand improvement are shown in the following tabulation.

	Acres treated		
	Financed under forest land management appropriation	*Financed with deposits from timber sales* [1]	*Total*
Kind of treatment:			
Planting	86, 926	73, 049	159, 975
Seeding	23, 444	14, 373	37, 817
Release and weeding.	131, 357	221, 294	352, 651
Precommercial thinning.	46, 820	40, 059	86, 879
Pruning	4, 515	29, 195	33, 710

[1] Funds collected from timber sale operators under the Knutson-Vandenberg Act of June 9, 1930 (16 U.S.C. 576b).

Timber Cut and Sold

Timber purchasers harvested 9 billion board feet of timber from the National Forests in fiscal year 1962; it was the second highest cut on record and an increase of 600 million board feet over the previous year. Receipts from National Forest timber brought $106.2 million into the U.S. Treasury, $7.8 million more than in the previous fiscal year; one-fourth of this income was returned to the States to help support schools and roads in the counties where the National Forests are located. On a calendar year basis the cut was even greater—a 12-month increase of 928,000 board feet for a total cut of 9.6 billion.

Sales of National Forest timber also improved; a total of 10.3 billion board feet was sold compared with 8.9 billion board feet in fiscal 1961.

Increases in both cut and sold volumes reflect some strengthening in a generally poor market, but other important factors were changes in minimum price policies and strengthened timber sales administration. Low demand for some species of timber or lack of markets in some areas still limits harvest of the full allowable cut. Nevertheless, steady progress has been made toward the full harvest of the allowable cut and toward greater sustained yields, as shown in the following tabulation.

	Sustained yield annual allowable cut [1] *(Billion board feet)*	*Actual cut (Billion board feet)*	*Percent of allowable cut harvested*
Fiscal year:			
1958	9. 9	6. 4	65
1959	10. 2	8. 3	81
1960	10. 6	9. 4	89
1961	11. 0	8. 4	76
1962	[2] 11. 2	9. 0	80

[1] As of Jan. 1 preceding the beginning of the fiscal year. This is the basis for sales planning and financing.
[2] The increase of 547 million board feet for 42 western National Forests announced Dec. 7, 1962, is not included.

RANGE MANAGEMENT

Grazing Fees: $3,805,000

The 62 million acres of range in the National Forests, National Grasslands, and land utilization projects provided grazing for 1.3 million cattle and horses, and 2.4 million sheep and goats, under paid permit during calendar year 1962. In addition, an estimated 2.3 million offspring grazed without charge. More than 19,000 ranchers and farmers used these lands to complement their year-round livestock production programs.

For the privilege of grazing livestock on the National Forests, permittees paid from 10 cents to over $3 per animal month for cattle and from 2.5 to 55 cents for sheep. Total receipts were $3,195,422.

On National Grasslands and land utilization projects, grazing fees ranged from $0.54 to $1.69 for cattle; sheep fees were one-fifth of those for cattle. Grazing receipts from the 2,600 permittees using these lands totaled $609,864. Total receipts for livestock grazing on all Forest Service-administered lands were $3,805,286. Of this total, 25 percent or $951,322 was paid to the States for the benefit of counties in which the rangelands were located.

Trial Program of Range Appraisal

The Bureau of Land Management and the Forest Service conducted a trial program of public land range appraisal in response to a directive from the Senate Committee on Appropriations to the Secretaries of the Interior and Agriculture. Sample areas administered by both agencies in Colorado, Montana, and Oregon were studied.

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In July the two Secretaries submitted the findings to Congress in a report entitled "The Look Forward—A Trial Program of Public Land Range Appraisal." The report illustrated the type of information that could be obtained from a nationwide appraisal of public rangelands, and included a prospectus for such a comprehensive survey. Outlined in the prospectus were the need for a nationwide appraisal, possible methods for conducting the appraisal, and preliminary cost and time estimates. The report and the prospectus are in Senate Document No. 119, 87th Congress, 2d session.

Research Into Ranch Operations

The Department of Agriculture's Economic Research Service, in cooperation with the Forest Service and the Bureau of Land Management, made a research evaluation of ranch operations that use public rangelands and the various impacts that result from adjustments in grazing privileges and fees. An administrative report has been prepared and circulated; the final comprehensive report is nearing completion and will be published as a USDA bulletin.

The study has developed information that will clarify some aspects of livestock grazing on public land under paid permit. One finding showed that grazing fees for the study area at 1960 levels (approximately 20 cents per animal-unit-month for Bureau of Land Management; and 60 cents per AUM for Forest Service) represented only a small percentage of cash operating expenses for most ranches (average cattle ranch—4.5 percent; average sheep ranch—3.2 percent). At the highest fee levels considered in this study (BLM, $1.00/AUM; FS, $1.40/AUM), fees would amount to 14.8 percent of cash operating costs for the average cattle ranch and 11 percent for the average sheep ranch.

The study also undertook to determine the effect of a 20-percent reduction in permitted use. It was found that most ranch operations would be affected more severely than by the highest level of increased fees considered in the study. The long-range effect of either increased fees or a grazing reduction would be a capital loss to the ranch operator.

Range Allotment Analysis

The Forest Service moved ahead in its program of analyzing vegetation, soils, and related information and in bringing plans up to date on each of the more than 11,300 grazing allotments in the National Forest System. During fiscal year 1962, work equivalent to completion of 696 allotment plans was accomplished, bringing the initial analysis job to 49 percent of completion. Information already gained has contributed to many improved management practices, including deferred rotation and other rotation systems of grazing, that are now in effect on many allotments throughout the West with the cooperation of the permittees.

Range Improvements

Besides control of livestock, the principal means of improving the range are range rehabilitation and construction of physical improvements. The Forest Service made many such improvements during fiscal year 1962, as follows:

	Acres
Range revegetation and rehabilitation:	
Undesirable plant control	105,217
Range reseeded to grass	92,396
Rodent control measures	16,041
Water spreading measures	7,716
Total range rehabilitation	221,370

Physical improvements:
- 1,787 miles of fences
- 298 cattleguards
- 689 springs developed
- 956 ponds and reservoirs
- 158 wells
- 110 miles of stock feedways
- 32 corrals

In addition, there was extensive cooperative assistance by the permittees.

OUTDOOR RECREATION

The National Forests and National Grasslands are ideally suited for the significant part they play in the Nation's outdoor recreation activities. These public lands are located in 41 States and Puerto Rico, and provide nearly every type of landscape, flora, and fauna—from tropical rain forest to arctic glaciers. In particular, many of the National Forests are on the headwaters of major rivers, in areas rich in scenic mountain and lake country, towards which much of the Nation's outdoor recreation is now oriented. The natural attractions of the National Forests are further augmented by an extensive system of physical improvements, which are now being expanded to meet rapidly increasing public demands.

Alltime Record: 113 Million Visits

The popularity of this outdoor recreation wealth was demonstrated in 1962 by the 113 million recreation visits to the National Forests. This was an 11-percent increase over 1961. About the same percentage increase has prevailed every year for more than a decade. Public recreation on these lands added up to 119 million visitor-days use—4 times the use recorded in 1950. Reflected in visitors' use of National Forests were a wide range of activities: Camping, picnicking, hunting, fishing, riding, hiking, skiing, wilderness travel, adventure, berry picking, nature study, or just plain enjoyment of the outdoors.

The following tabulation of 1950 and 1962 data shows the growth of National Forest recreation activities.

VISITS TO NATIONAL FORESTS AND NATIONAL GRASSLANDS (IN THOUSANDS)

Primary purpose of visit:	*1950*	*1962*
General enjoyment of forest environment	7,969	40,452
Picknicking	6,326	20,783
Fishing	4,885	17,008
Hunting	2,285	8,854
Camping	1,534	7,992
Winter sports	1,517	5,286
Swimming	902	3,150
Hiking and riding	635	2,539
Others	1,315	6,698
Total	27,368	112,762

Much of this public recreation activity requires nothing more than roads, trails, and beautiful scenery. But to serve outdoor recreation needs there is also an extensive system of developed facilities, some publicly owned and many privately owned and operated under permit. This system includes 4,221 campgrounds; 1,264 picnic sites; 556 organization camps; 418 hotels, lodges, and resorts; 18,230 cabins and summer homes; 196 swimming sites; 391 boating sites; 189 winter sports sites; 242 observation viewpoints; and 84 areas in wilderness, wild, or primitive status.

More Development Needed

Despite the large number of developed facilities, many National Forest areas are severely overcrowded as a result of the steady growth in public use. A 5-year program called Operation Outdoors was started in 1957 to relieve the existing situation through rehabilitation and new recreation area construction. But recreation use during those 5 years far exceeded anticipated use. Recreation improvement needs are now incorporated in the Development Program for the National Forests.

In the 5 years since Operation Outdoors began, the Forest Service intensified service and maintenance on all existing recreation areas, renovated 21,578 family camp and picnic units, and constructed 17,051 new family camp and picnic units. In addition 30 winter sports areas were expanded or developed; 59 swimming sites and several boating sites, scenic overlooks, and other areas were constructed.

The Forest Service continues its program of reclassifying primitive areas to more permanent status, either by making them a part of the wilderness system under Secretary's Regulations U–1 and U–2, or by otherwise putting them under the type of administration indicated by their predominant values. After public hearings and extensive investigations, the Anaconda-Pintlar Primitive Area in Montana was formally reclassified as a Wilderness Area in December 1962, and on January 11, 1963, the Selway-Bitterroot Primitive Area in Idaho and Montana became the largest established wilderness in the National Forests. Following these two important actions, the Forest Service wilderness system consisted of the following:

	As of January 11, 1963	
Type of area:	*Number of units*	*Acres*
Wilderness	16	6,285,816
Wild	30	1,047,554
Canoe	1	886,673
Primitive	37	6,098,532
Total	84	14,318,575

The newly designated Anaconda-Pintlar Wilderness Area contains 159,000 acres of rugged mountains along the Continental Divide about 20 to 30 miles southwest from Anaconda and Butte. This area in the Anaconda Range is some 30 miles long and averages about 10 miles in width; elevations range from 6,100 feet above sea level to 10,475 feet at the highest point.

The new Selway-Bitterroot Wilderness Area consists of 1,239,800 acres within the Bitterroot, Lolo, Clearwater, and Nezperce National Forests along the Bitterroot Divide between Idaho and Montana. In establishing the area, some areas outside the previous primitive area were added, 418,500 acres of the primitive area was returned to regular National Forest resource management, and 216,870 acres was retained in primitive status and designated the Salmon River Breaks Primitive Area pending further study. Some 4,000 groups and individuals had presented written or oral statements about the area before reclassification was made. Three public hearings were held on the proposal to reclassify this significant unit of the wilderness system.

New Scenic Areas

Eleven new scenic areas were added to the growing system of areas of unusual interest in the National Forests. All such areas have outstanding characteristics that make them predominantly valuable for scenic enjoyment and for which special management is required. Most spectacular of the recently established areas is the Hells Canyon-Seven Devils Scenic Area of Oregon and Idaho; it will be developed to provide both back-country and general use recreation opportunities with emphasis on outstanding scenic qualities. Commodity uses are permitted under restrictions necessary to protect scenic values.

For Better Skiing

Six new winter sports areas, operated on or in conjunction with National Forest areas, were constructed or newly opened in 1962. They are—

	National Forest
1. Lake Eldora near Boulder, Colo.	Roosevelt
2. Indianhead near Georgetown, Colo.	Arapaho
3. Vail near Minturn, Colo.	White River
4. Crystal Mountain near Enumclaw, Wash.	Snoqualmie
5. Rose Spring near Pomeroy, Wash.	Umatilla
6. Anthony Lake near North Powder, Oreg.	Whitman

Much other work is going ahead under National Forest special use permits to develop new sites or expand existing sites. Within the past 4 years there has been construction or expansion of some 50 lifts or gondolas, 43 T-bar and Poma lifts, 36 rope tows, 8 lodges, and 32 shelters.

Recreation Plans

At the close of fiscal year 1962 the National Forest recreation management plan project was well underway with 22 percent of the overall work completed. The project, begun in 1961, calls for preparation of comprehensive management plans for recreation resources on all administrative units. These plans will contain specific schedules for the development, classification, and management of sites and areas needed by 1976, consistent with multiple use policies and decisions and correlated with the development program for the National Forests.

SPECIAL USES AND MINERALS

Hundreds of Special Uses

The National Forests and National Grasslands serve many types of special uses not usually thought of in connection with forest resources, but which are essential to social, commercial, economic, and defense needs of the Nation. Permits have been issued for more than 100 different kinds of use, including radio and television transmission sites; rights-of-way for telephone, telegraph, and power lines; pipelines; radar sites; churches; parks; schools; landing fields; community water supplies; and many others serving both national and local needs. More than 60,000 special use permits including recreation developments are in effect on over 4 million acres.

Many special use permits provide for public and private enjoyment of National Forests and Grasslands, supplementing free recreation use, such as camping, picnicking, and the like. Receipts from commercial public service permits and recreation residences and camps amounted to $1,340,000.

Receipts from Forest Service permits for other than recreation purposes provided an additional $430,000 in revenue to the United States. There were also 17.5 million acres of land under Department of Interior easements, oil and gas leases, and mining and prospecting permits, fees from most of which—those on former public domain lands—are not credited as National Forest revenues.

Revenues From Oil, Gas, and Power Sites

Oil, gas, and mineral revenues on approximately 3,500,000 acres of acquired National Forest lands amounted to $2,370,000 and were credited as National Forest receipts. Federal Power Commission permits and licenses on the National Forests covered 84,850 acres and extended over 1,580 miles of rights-of-way. Uses authorized by the Forest Service for power purposes added $66,000 to National Forest receipts.

Under the Surface

While the primary concern of the Forest Service is protection and management of renewable surface resources, there are many National Forest areas beneath which lie oil, gas, coal, and other minerals which may properly be developed within the framework of multiple use management. Oil and gas leases and other mineral leases and permits provide for exploration and development in a way that secures protection for surface resources. Some major agreements were reached this year illustrating new ways in which subsurface and surface resource development may be effectively correlated. Most of these agreements are possible only because of the close cooperation that exists between the Forest Service and two Department of the Interior agencies, the Bureau of Land Management and the Geological Survey. These agencies in most cases have major responsibility for administration of mineral claims and oil and gas leases.

Oil Exploration in Arizona

Differences between wildlife and oil development interests were resolved in a joint Agriculture-Interior decision to permit exploration and development of oil and gas resources in the North Kaibab section of the Kaibab National Forest, Ariz. The Secretary of Agriculture and the Secretary of Interior, acting jointly, set forth 35 stipulations designed to meet the objectives of wildlife management. Suggestions on measures needed to do this were sought from sportsmen and other conservationists at a public hearing in July 1960. These stipulations were worked out in cooperation with the Bureau of Land Management (which has legal authority to issue the leases), the Geological Survey, the State of Arizona, and the petroleum industry. They include control of the number of wells to be drilled at any one time; location, construction, and use of roads; location of pipelines; limitations on tanks and other surface uses; disposition of equipment; measures for revegetation; and measures to protect scenic environment, water, wildlife, and other resources.

Lead in Missouri

In Missouri, the Forest Service, working with the U.S. Geological Survey, prepared land management provisions for the St. Joseph Lead Co. development contract, providing for surface utilization and protection and permitting unified operations of Government and privately owned minerals in the Clark National Forest.

WATERSHED MANAGEMENT

Water is the critical resource; no life can survive without it. This fact is of great significance

in the management of the National Forests, for these public lands include some of our most highly productive watersheds. In the 11 Western States, the National Forests make up one-fifth of the land area but are the source of more than half of the entire streamflow. East of the Great Plains the National Forests cover a smaller proportionate area; nevertheless, they encompass critical headwater areas of great rivers: Mississippi, Ohio, Tennessee, Potomac, Chattahoochee, and others.

The Forest Service meets its responsibilities to protect, maintain, and improve watersheds by several different means. Deteriorated and damaged, and eroding land is rehabilitated. Burned-over areas are stabilized with emergency vegetative treatment to prevent site deterioration and water polution. In a few areas where water supplies are limited and hydrologic conditions permit, the Forest Service takes steps to increase waterflow by artificial and other means. Other resource work is coordinated so as to protect watersheds and to prevent soil erosion.

Healing the Land

Each year new progress is made toward restoration of land that has long needed major rehabilitation, particularly in areas where natural processes are too slow to stop accelerated deterioration. In 1962 Forest Service crews stabilized 50,000 sheet-eroded acres by means of terraces, contour furrows, and revegetation. More than 2,500 miles of gullied roads and trails and eroded streambanks were stabilized. Much more remains to be done to complete the necessary rehabilitation job on the National Forests and Grasslands.

On the 88,000 acres burned in 1962, first-aid watershed measures were installed on all critical slopes. Also a substantial amount of debris was removed from channels and streambanks were stabilized following the disastrous October storm in northern California, Oregon, and Washington.

Reservoir Site Surveys

Within the National Forests are many of the remaining reservoir sites for flood control, hydroelectric power, irrigation, and other purposes. With expanding needs for all natural resources, these reservoirs must serve all possible other related purposes, such as recreation and wildlife. To make sure that new projects serve these needs, the Forest Service studied and evaluated more than 120 proposed sites in 1962—double the number for the year before.

For Improved Water Yield

The same old waterflow is not good enough for many areas—more people using more water for more purposes adds up to more water needed. In some areas the Forest Service is applying up-to-date scientific information to provide more water in a steadier year-round flow. Some of the proven techniques include timber cutting in special patterns and construction of barriers in a manner that will increase the volume of the snowpack.

Livestock grazing seasons are adjusted to improve hydrologic conditions. Location, design, and construction standards for timber sales, roads, trails, and other installations are prescribed to prevent erosion, sedimentation, and stream pollution.

Work continued on the many projects reported in previous years, and new starts were made on highly significant watershed management projects.

The Pole Mountain Project on the Medicine Bow National Forest, Wyo., is putting to practice on an operational basis the knowledge thus far developed about snowpack manipulation. Artificial barriers are being erected above timberline or in large natural openings so as to modify snowdrifting for heavier snow accumulation. The objective is a longer period of snowmelt and reduced possibility of spring floods.

On the Jefferson National Forest, Va., the Brushy Mountain Project was completed. Here manganese mining spoil banks were stabilized by a combination of techniques—terracing, check dams, and revegetation.

On the Carson National Forest, N. Mex., weirs were installed on Rito LaPresa and Chacon Ditch to determine the effects on water production of clear cutting beetle-infested trees. The data acquired is needed for the design of rehabilitation measures for the area.

An analysis of available precipitation and water yield data from the Santa Fe River, N. Mex., was published during the year. The report covered the period 1914–57, and will supply information necessary for improved watershed management practice. This will vitally affect the city of Santa Fe which receives its water supply from the river.

Soils Surveyed

Standard soil surveys were completed on approximately a million acres, and reconnaissance surveys were completed on additional 1,400,000 acres.

FIRE CONTROL

Fire Season Near Normal in 1962

The 1962 fire season on the National Forests and Grasslands in general was about normal in severity but set an alltime record low in area burned—85,457 acres. The 5-year average is 238,988 acres burned annually. The previous record low was 107,816 acres in 1937.

From all causes, 11,494 fires occurred on National Forests during the year—3 percent more than the 1957–61 5-year average but far fewer than last year's near record of 15,159 fires.

Man-caused fires increased 13 percent over 1961 and exceeded the 5-year average by nearly 17 percent.

Fire danger was about of average severity in California, Arizona, New Mexico, Colorado,

Nevada, and Utah. In the East burning conditions were more critical than usual because of severe drought conditions in the winter and spring months.

Few Large Fires

The 1962 fire season started at about the usual time in the western regions, in contrast with the previous 3 years when it started 2 weeks to a month earlier. Three successive years of severe drought were broken. On many National Forests, however, the fire season lasted 1 to 2 months longer than usual.

Only 14 fires exceeded 1,000 acres in size. In the previous year there were 43 such fires, and 59 in 1960. None of the 1962 fires reached the large size of several in the 2 previous years. East of the Plains there were 30 percent more fires than the 1957–61 5-year average, and the area burned exceeded the 5-year average by 50 percent. Fire danger in Alaska was again much below normal.

Air Attack Aids Control

Much of the credit for keeping burned area to a record low must be given to fast, hard-hitting initial air attack. Smokejumpers made their usual highly efficient air attacks. More men were especially trained for helicopter attack than ever before. Improved methods and techniques developed for airtanker initial attack held many potentially dangerous fires to small size. The air attack capability was greatly augmented by the addition of more strategically located airtanker bases and the construction of hundreds of helispots and heliports. An evaluation procedure for measuring the effectiveness of airtanker retardant drops was started in 1962.

Aircraft flew 29,408 hours in 1962. This was only about half the aircraft use in 1961, a reduction largely due to the lighter firefighting requirements. As in past years, aircraft were used principally for aerial reconnaissance on going fires, transportation of men and equipment, and aerial delivery of chemical fire retardants on fires.

Fatalities in Forest Firefighting

Fourteen men lost their lives fighting fires on the National Forests in 1962. Even though the loss is less than for the 2 preceding years, it is a high price to pay for fire control. Six of the men were killed in four aircraft accidents; one was a Forest Service pilot, two were pilots employed by contractors, two were Forest Service employees, and one was a nonemployee passenger. Seven Forest Service employees were killed fighting fires on the ground; four were burned to death, two killed by rolling rocks, and one killed by a falling snag. Burns also took the life of a Soil Conservation Service employee who was fighting a fire with a Forest Service crew.

Better Equipment

The Forest Service continued to improve equipment for all phases of fire control. A lightweight powered fireline trencher enabled firefighters to build three times more line per man than is normally accomplished with handtools. A sand-casting machine tested in Michigan and Georgia shows promise, and is being developed further. Service-wide conversion of all firehose couplings to a standard thread is well underway.

In the air, a major effort was made to improve the handling of fire retardant chemicals. A comprehensive text on retardants, related equipment, and techniques was prepared and is being applied in the development of instructions. To improve operations, a portable chemical mixer is now in use. A "skywriter" device that was demonstrated enables lead planes to mark airtanker drop targets with colored smoke. Roller conveyors with special parachutes and packaging systems designed for large aircraft will reduce flying and ground recovery costs in paracargo operations.

Other developments include flame-resistant clothing successfully used against actual fires, military freeze-dehydrated field rations for use in fire camps, and the award of a contract for construction of 12 fire-weather telemeter units that are to be field tested.

Worldwide Fire Control Assistance

Other countries sought help from the Forest Service on fire control problems through advice by correspondence, visits by their officials to Washington, or trips abroad by Forest Service staff members. Forest Service officers made special visits to four provinces in Canada and to the Republic of Argentina. A special working group on fire problems was formed within the North American Forestry Conference, sponsored by FAO; at the organizing meeting held in October in Washington, subcommittees were formed to study fire research, fire prevention, and fire control.

ENGINEERING

Work of the Forest Service engineers backs up many aspects of resource management and protection. Their responsibilities include roads and trails, building construction, mapping, surveys, signs, water developments, and equipment maintenance and development.

Roads and Trails

National Forests at the end of fiscal year 1962 were served by a transportation system consisting of 186,067 miles of forest development roads, 105,626 miles of trails, and 269 landing fields for fixed-wing aircraft. Improvements during the year included construction of 305 miles of new roads and reconstruction of 306 miles of existing roads to higher standards necessary for more intensive and varied use. Other improvements included construction or replacement of 247

bridges, 181 miles of new or improved trails, and construction or improvement of 93 fixed-wing aircraft landing fields. Funds obligated for maintenance, construction, and reconstruction by the Forest Service amounted to $46 million, while a further 1 million dollars was obligated for road purchase. In addition, timber purchasers and cooperators constructed 3,693 miles and maintained 17,173 miles of roads within the Forest Service transportation system, at a cost of more than $50 million.

Automation and Engineering

Electronic computers are increasingly providing greater efficiency and economy for the road and trail program. Computers are being used to speed up computations of engineering statistics and road design information, with considerable savings of engineer-designer time on an hour/mile base.

Engineers, for example, are beginning to spend less and less time with slide rules and desk calculators as they turn more and more to computers and other automatic data processing devices. Road designing on National Forests provides an instance. On an average, computers enable engineers to do in a third of the time what they once did manually. Thus they have extra time to put into use more of their interpretive skills.

Use of computers also results in reduction of costs and errors and in higher quality designs. As for costs, it has been estimated that computer use effects a 20-percent saving compared to work done manually.

Efforts are being made to broaden the use of computers to the fields of photogrammetry and bridge design.

Vehicles Logged 91 Million Miles

Forest Service vehicles logged more than 77 million miles in 1962. Rented vehicles used by the Forest Service brought the total mileage to 91,284,000 miles. To further improve management of the Forest Service fleet, a study has been started to analyze and compare costs of equipment use by Forest Service Regions.

More Buildings Essential

The wide range of Forest Service operations is reflected in the fiscal year 1962 building program. New construction included 103 dwellings, 18 barracks and cabins, 45 lookouts, and 245 other buildings such as offices, warehouses, messhalls, garages, and nursery buildings. Construction began on 16 research laboratories of which 2 (at Laramie, Wyo. and Bozeman, Mont.) have been completed. Planning started on the five research buildings scheduled for the fiscal year 1963 program.

Water Developments

The Forest Service continued to give special attention to recreation potential of water impoundment projects proposed for occupancy on National Forest lands. This emphasis is reflected particularly in Forest Service recommendations for development of public access hydroelectric projects licensed by the Federal Power Commission. Plans were investigated and approved for 553 dams to be built by special use permittees and other users of National Forest lands.

Wherever dams occupy National Forest land, special efforts are being made to verify that they are safe, and that they fulfill their intended purposes. The scope and intensity of these engineering investigations are related to the size, cost, and potential impact of the proposed structure.

Property Lines and Corners

The importance of relocating and permanently remonumenting all property corners on the National Forests has been graphically demonstrated by the intensive field search that has been underway in recent years. Evidence of old corners set during original surveys is rapidly disappearing. Search crews in calendar year 1960 found sufficient evidence to remonument 70.1 percent of the corners searched, but in 1962 only 60.4 of the corners searched could be remonumented without additional surveys.

In calendar year 1962, field search was made for 18,832 property corners. Evaluation of on-the-ground evidence showed that 11,381 of these corners can be remonumented without additional cadastral surveys. Lack of sufficient evidence for certification will make expensive cadastral surveys necessary before the other 7,451 corners can be remonumented. During the year, 7,975 corners were permanently remonumented with standard brass-capped iron pipe and concrete posts.

A total of 984 miles of property lines were located, marked, and posted in accordance with standard practice. An additional 1,274 miles of property lines were adequately marked and posted so that they subsequently can be marked to comply with standard practice. In 68 field meetings held in the Regions, 562 forest officers were trained in corner search, evaluation, and line marking and posting.

Aerial Photography Use Grows

The use of aerial photography by the Forest Service as an aid to resource management continues to increase. Contracts were awarded during Fiscal Year 1962 for 50,275 square miles of large-scale (1:12,000 to 1:15,840) photography for resource and management studies. This represents an increase of 12 percent over Fiscal Year 1961. During the same period small-scale mapping photography was obtained for 1,860 square miles.

Surveys and Maps

Forest Service map coverage requirements are for 775,461 square miles of land. The area is slightly less than the 786,655 square miles reported

for 1961 as a result of adjustments in unit boundaries through exchange, or transfer of administrative responsibility.

During Fiscal Year 1962, the Forest Service produced planimetric maps for 43,573 square miles of National Forest, National Grassland, and adjoining or intermingled lands. At the end of the fiscal year, planimetric maps were available for 292,515 square miles or 38 percent of the area of interest, and source data was available for an additional 427,232 square miles.

Estimated needs for topographic map coverage are 617,350 square miles, as compared with 624,916 square miles reported for 1961. During the year the Forest Service completed topographic maps for 1,193 square miles; and other agencies—principally the Geological Survey—completed topographic maps for 13,722 square miles of National Forest, National Grassland, and intermingled or adjacent lands. At the end of the fiscal year completely adequate topographic maps were available for 35 percent of the required coverage. An additional 26 percent of coverage was available but not up to standard.

Improving National Forest Signs

A distinctive "trademark" style of lettering, relocation of the Forest Service shield, and prominent display of "U.S. Department of Agriculture" are main points in the design for new entrance signs on National Forests and National Grasslands. The new design aims for more complete and proper identification by the traveling public. Other signs, including rural headquarters signs, will continue the new arrangement to acquaint visitors with activities and multiple use objectives on lands in the National Forest System.

LANDS

National Forest management is being improved continuously through programs of land classification and adjustment, whereby boundaries are adjusted; rights of access are obtained; land lines and corners are accurately located, marked, and monumented; scattered Federal holdings are consolidated through land purchases and exchanges; and accurate ownership and status records are currently compiled and made available to all land managers.

During the year the Marquette National Forest in Michigan was abolished and its land consolidated into the Hiawatha National Forest. In Texas the former land utilization project TX–24 became the McClellan Creek National Grassland. There are now 154 National Forests and 19 National Grasslands within the National Forest System.

Purchases and Exchanges

During fiscal year 1962 the National Forest Reservation Commission approved the purchase for Forest Service purposes of 165 tracts involving a total 22,556 acres. Of these purchases 148 tracts with 20,335 acres were acquired under provisions of the Weeks law; the remaining areas were acquired under purchase authorities affecting the Cache National Forest, Utah, and the Superior National Forest, Minn.

An additional 431 acres in 50 tracts were bought to meet Forest Service requirements for administrative buildings and facilities, including land for two forest nurseries.

Ninety-one land exchanges were approved whereby the United States conveyed 40,890 acres of Government land with 3,345,000 board feet of timber and received 53,320 acres of private, State, or county lands within National Forest and National Grassland boundaries.

Important Changes

Among the many actions affecting National Forest lands some of the more significant were—

Extension of the boundaries of the Pike National Forest in Colorado and the Carson and Santa Fe National Forests in New Mexico to include 223,000 acres of former land utilization projects administered by the Forest Service.

Extension of the boundary of the Wasatch National Forest in Utah and authorization for additional land purchase so as to provide watershed protection and rehabilitation on 24,000 additional acres.

Inclusion within the Superior National Forest in Minnesota and the Clark National Forest in Missouri of parts of established Weeks law purchase units.

Exclusion from the Los Padres National Forest, California, of 75,000 acres previously transferred to the Department of the Army for military purposes.

Transfer to the Department of the Army of 9,940 acres of National Forest land within Fort Leonard Wood, Mo., in exchange for 9,795 acres of military lands within the Clark National Forest.

Transfer to the Jefferson and Cherokee National Forests of 3,739 acres acquired by the Tennessee Valley Authority and concurrent transfer to the TVA of 1,196 acres of National Forest land in Tennessee.

In summary, the changes in land areas administered by the Forest Service in fiscal year 1962 are as follows:

	Acres
Total area administered by Forest Service (owned by United States) June 30, 1961	186, 160, 311
Increases:	
1. Purchased	10, 543
2. Conveyed to United States in exchange	126, 209
3. Donated to United States	1, 004
4. Transferred from other Federal agencies	11, 372
5. Reserved from public domain	1, 621
6. Recomputations, adjustments, and miscellaneous	806
Total	151, 555

Reductions:	*Acres*
1. Conveyed by United States in exchange	84, 244
2. Grants, sales, reconveyances, mining patents, homesteads, etc	10, 636
3. Transferred to other Federal agencies	25, 972
4. Eliminated from National Forests and returned to public domain status	11
5. Recomputations, adjustments, and miscellaneous	25, 170
Total	146, 033
Difference between increases and reductions	5, 522
Total area administered by Forest Service (owned by United States) June 30, 1962	186, 165, 833

Rights-of-Way

In many aspects of National Forest management rights-of-way are as crucial as land ownership. During the fiscal year a total of 712 rights-of-way were acquired at a cost of $925,000. Of these cases, 496 were easements for roads to be constructed and 216 were conveyances of interests in nonfederally-owned roads providing access to the National Forests. Six of the cases were major access road purchases involving 174 miles of existing roads, which provided access to about 2.5 billion board feet of National Forest timber.

A total of 11 condemnation suits for rights-of-way were filed in calendar year 1962, as against 4 cases filed the previous year.

But the most significant development in providing better access resulted from an opinion of the Attorney General issued February 1, 1962. The opinion held that nonresident landowners within National Forests are not to be considered bona fide settlers and do not qualify for the same rights provided by law to the latter. In consequence, a new policy is being developed which, with some exceptions, will provide that the Forest Service will grant permanent rights-of-way to such nonresident owners across Federal land on condition that similar access across their property is granted.

This policy, among others, is included in proposed new regulations which were drafted and circulated for comment. In the interim, a cooperative road program regulation was published in the *Federal Register* on October 23, 1962. During the past decade, some 81 cooperative road construction and use agreements, including 11 since adoption of the October 23 regulation, had been consummated. These will provide access to about 27 billion board feet of National Forest timber and many other important resource values. Negotiations have begun for 74 more cases.

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Forestry Research

From the care and feeding of tiny tree seedlings, to the use of electron microscopes for peering into the structure of wood, to the preservation of railroad ties, to a hundred other avenues of scientific inquiries, the Forest Service carries on constant research. The more than 40 scientific disciplines represented in Forest Service laboratories attest to the wide scope and diversity of the research job. Chemists, plant pathologists, mathematicians, engineers, physicists, geneticists, and forest products technologists are but a few of the specialists working in this broad field of forestry.

The work is carried on by the Forest Service mainly through its 10 regional Experiment Stations, the Forest Products Laboratory, and the Institute of Tropical Forestry, with additional studies at the Washington Office headquarters. Research scientists and foresters study problems related to management of timber, water, range forage, wildlife habitat, and recreational resources. They seek better ways to protect these resources from fire, insects, and diseases. Research also develops improved utilization of wood products, new equipment and engineering systems for forestry operations, broader knowledge of forest economics, and better markets for forest products. A continuing forest survey provides comprehensive information on the extent and condition of forest lands, the volume and quality of timber resources, trends in timber growth and harvest, and the outlook for future supplies and demands.

FOREST RECREATION RESEARCH

Patterns of Use Studied

Our studies show there is much to learn about visitor preferences and their use of recreational areas and facilities. In Oregon 91 percent of the wilderness visitors in 1961 were found to be Oregonians or friends accompanying them. Most visitors walked into the area in groups of two to five and stayed just for the day, then returned to their homes less than 100 miles away. In Minnesota's Boundary Waters Canoe Area, the number of visits per year was shown to be considerably higher than had been previously estimated. Visitors were highly concentrated in some places, while other attractive areas in the Boundary Waters Area equally accessible were seldom visited.

In the Rockies it was learned that hunters preferred undeveloped campgrounds. In 1961 only 9 percent of the hunters used specially developed hunter camps; 24 percent used regular camp or picnic grounds; the remaining 67 percent used undeveloped hunter camps. And picnickers in Pennsylvania seldom used tables more than 250 feet from a parking area. Even under extremely crowded conditions, tables beyond 400 feet were not used. Increased knowledge about National Forest visitors should guide management in making decisions that will provide more satisfying recreation experiences for them.

Micro-Wilderness

Recreation researchers in Utah are exploring the idea of providing "pint-size" primitive units for forest visitors that can be easily traversed on foot. The perimeter of such a "micro-wilderness" would be readily accessible. With adequate trails and maps, one could hike reasonably short distances to surroundings just as wild as those found in a large wilderness. To the extent it is successful, the micro-wilderness can broaden the recreation opportunity and lessen the pressure on highly developed areas.

The Recreation Impact

A study of three National Forests in California indicates that full recreational development of all suitable sites in these forests would increase the recreation capacity 1,000 percent, but reduce the sustained yield timber production only 13 percent. This assumes no timber cut from lands used for recreation.

A southern Appalachian study shows that the more fertile sites can better withstand trampling, insects, and disease. Hardwoods are generally more resistant than conifers. Plants in the Heath family, such a rhododendron and mountain laurel, can withstand an environment of heavy sustained recreational use. Tree-crown canopy reduction will stimulate ground level vegetation. Such information is used to plan recreation area locations so that sites selected can withstand the wear and tear of heavy use.

FOREST PRODUCTS UTILIZATION

Increasing Yield of Kraft Pulp

Current wood fiber research shows promise for bringing about an increase in kraft pulp yield by use of polysulfide pulping liquor. Basically this is a modified kraft process that uses more sulfur

in the pulping liquor with which the wood chips are "cooked" in the digester. Within the past year, results have shown that the polysulfide process increases yield about 20 percent at any given lignin content.

The increase comes about through an increase in the hemicellulose content of the pulp, and is accomplished without weakening it. An increase of this magnitude in pulp yield would mean a 120-ton-a-day production increase for a 600-ton average-size mill from the same amount of pulpwood, or an increased value of around $5 million a year. The full potentialities of this process, however, hinge upon development of suitable chemical recovery methods.

Half-Century Study of Railroad Ties

Fifty-one years ago the Forest Products Laboratory, then a year old, began a cooperative study of the service life of railroad ties with the Milwaukee Road. This year the study was pronounced complete with the conclusion that preservative treatment can prolong serviceability fivefold or longer. For example, it showed that an untreated red oak tie must be replaced in 9 years on the average, whereas its well-creosoted counterpart can be expected to remain in use half a century. Preservative treatment, by greatly reducing replacement costs, is estimated by the railroads to save them $130 million annually.

Engineered Wood Construction

Basic research of the Forest Products Laboratory on fatigue properties of wood has been applied effectively to the solution of a complex problem facing the American railroads. In cooperation with the Association of American Rail-Roads, the effects of repeated loadings—up to 2 million cycles—were evaluated on small-scale simulated bridge members, and checked on full-size stringers. From this basic information, mathematical design criteria and formulas were devised to insure at least a 40-year fatigue life for timber bridges subjected to the very rapid loading rates produced by the wheels of locomotives and railroad cars.

Solar Dryer Cuts Seasoning Time

The Forest Products Laboratory's solar lumber dryer, designed to concentrate the sun's heat for faster low-cost drying, is being pilot tested by a custom dryer for furniture makers at Grand Rapids, Mich. In some areas, drying time is halved as compared with conventional air drying outdoors, a practice still widely followed for hardwood lumber. Air drying removes most of the moisture, thus saving kiln time and costs for final drying, but ties up large quantities of lumber for lengthy periods. Solar drying, therefore, promises to reduce tieup of capital investment in raw lumber as well as enabling savings in kiln time by more thorough drying than is gained with air drying.

Improved Stability of Paper

Printers of maps, charts, register bond, and multicolored publications, and especially manufacturers of the tabulating cards so heavily used in computers, need stable papers which will not change dimension when exposed to variations in relative humidity. Recent studies at the Forest Products Laboratory have shown that the dimensional stability of paper can be significantly increased by applying tension to stretch and prevent shrinkage of the paper during drying. This type of mechanical treatment can be applied on a paper machine during manufacture to improve dimensional stability of paper in the cross-machine direction. Preliminary experiments with expander rolls have demonstrated that improvement can be obtained with little or no loss in other desirable properties.

Box Pallets for Fruits

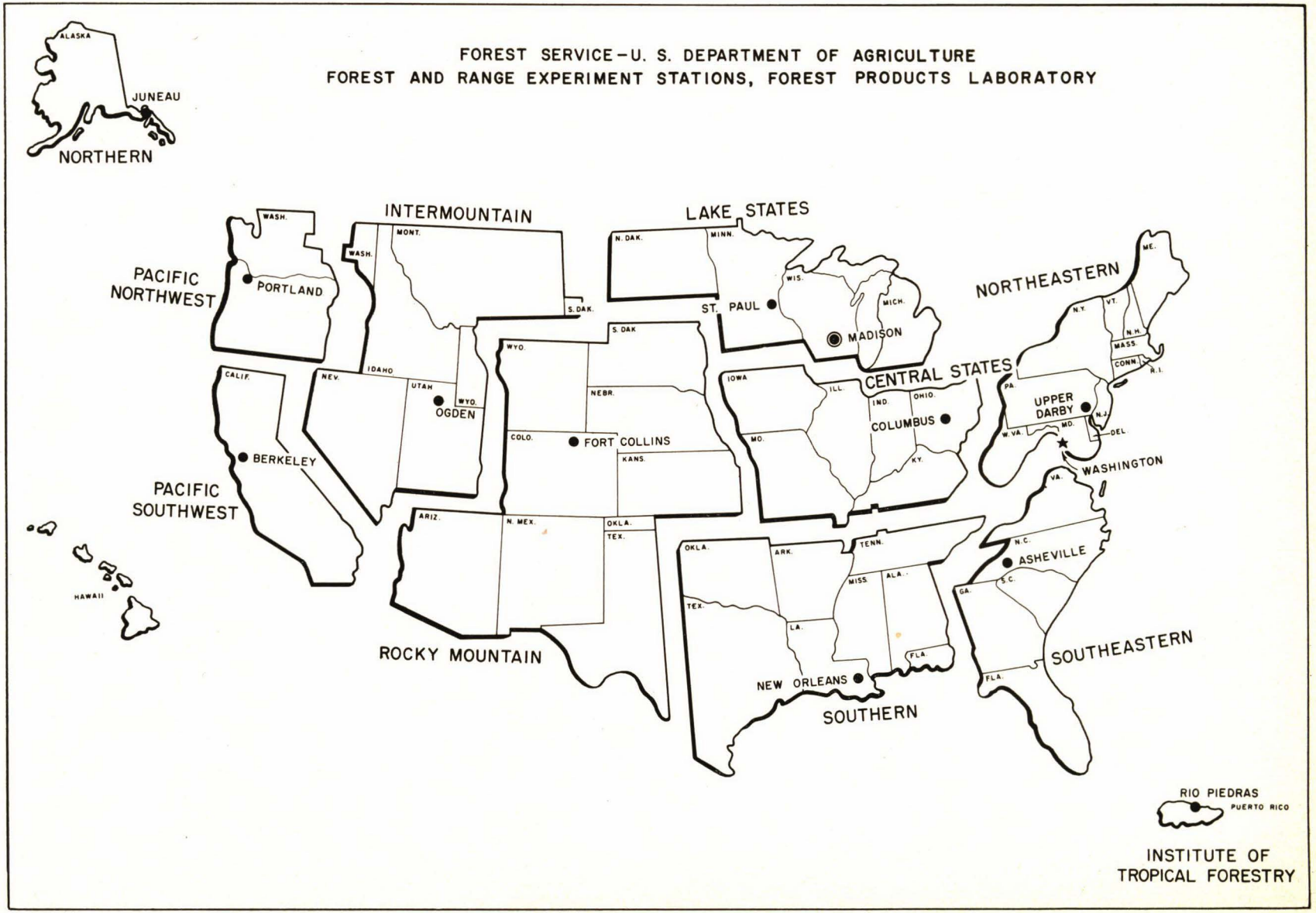
In a cooperative program undertaken with USDA's Agricultural Marketing Service, the Forest Products Laboratory engineered the design of a new type of pallet container for fruit. It successfully passed rigorous experimental evaluation and is being adopted commercially. Savings in shipping costs alone vary from 33 to 50 percent, with added savings resulting from reduced loading and unloading time and faster bagging at the terminal market.

The lightweight pallet was planned for efficient shipment by rail or truck. The triple-wall corrugated upper assembly, including bottom tray and top cap, was designed to provide the necessary bulge resistance and stacking strength for three-high stacking loads in the humid atmospheres of refrigeration cars and trucks. The fruit rides just as easily in these larger containers as in the more conventional bags or boxes and reaches market in undamaged condition.

Distribution of Lignin in Wood

The electron microscope—capable of magnifying 200,000 times—is giving us new knowledge of lignin distribution in the various layers of the fiber wall. This basic research carries enormous practical promise.

For one thing, since lignin is the bonding agent that holds wood fibers together, it obviously has much to do with strength, dimensional stability, and related properties of both the wood and the fiber. Knowing where lignin is in the fiber wall can also greatly aid us in devising more efficient chemical pulping methods. Knowing where it is, we can find better ways of removing it by chemical or other treatments to get better penetration of wood with preservatives, finishes, and other chemicals, thereby improving the resistance of wood to weathering, insects, decay, and fire.



Experiment station headquarters, Forest Products Laboratory.

Most theories of the distribution of lignin in wood have been developed from past research with light microscopes. The much more powerful electron microscope can help us judge whether these theories may serve as starting points for other basic and applied research.

Equipment Research

The objective of this program is to develop more efficient harvesting, transport, and other materials-handling operations for forestry to reduce raw material costs, minimize damage to water and soil values, and to assist in application of findings in silviculture and other forestry research. Programs were accelerated at three recently established engineering research laboratories (Auburn, Ala.; Houghton, Mich.; and Bozeman, Mont.) and a fourth laboratory was activated at Seattle, Wash. Studies on pipeline transportation of wood chips and use of helicopters for harvesting indicate that these methods of transport offer great promise for design of more efficient materials-handling systems compatible with multiple use objectives.

FOREST FIRE RESEARCH

Moisture and Fire Danger

Laboratory experiments with controlled fires to reduce the scatter of data and to test the full range of moisture content of forest fuels revealed that rate of fire spread and fire intensity became much more critical at low fuel moistures than was previously thought. Flammability increases slowly with decreasing fuel moisture down to about 6 percent moisture content. As moisture decreases below this point, however, flammability increases more and more abruptly, approaching a virtually explosive burning condition. Quantitative information of this nature has immediate application in field practice, red-flagging those occasional days when the moisture in forest fuels drops to 5 percent or below.

In other experiments at forest fire laboratories, scientists produced tornado-like fire whirls which, on a larger scale, often cause forest fires to get completely out of hand, and at times threaten the lives of firefighters. Conditions that lead to the formation of these whirls are being identified and measured under laboratory controlled conditions. This will provide ways to identify forest and weather situations under which special measures should be taken to guard against these whirls.

Weather and Topography

Much of the unpredictable behavior of brush fires in California, such as was demonstrated in 1961, is due to the ebb and flow of marine and desert air with their opposing effects. Such air movements are complicated by rugged topography. Intensive field studies now in progress give promise of increasing the understanding of these air movements to a point where they can be anticipated with confidence. This can greatly increase the efficiency of firefighting and the safety of forest firefighters.

Typical findings that affect the spread of brush fires are that in east-facing canyons in the coastal mountains of California, the daytime thermal up-canyon winds sometimes shift to strong down-canyon winds in early afternoon rather than at sunset. Similar shifts occur in the western foothills of the Sierra Nevada.

Along west-facing slopes of the coastal mountains marine air is in a shallow layer in the coastal lowlands at night, leaving much of the mountain slopes exposed to dry air. During the day, thermal winds aided by the sea breeze cause turbulent mixing that brings moist air to higher levels and often creates higher humidities on mountain slopes in spite of higher temperature. At night, as the air cools, downslope winds set in and marine air recedes to lower levels again. The "normal" pattern of rising humidity at night and falling humidity during the day is thus limited to lowland areas which remain in the marine layer.

Aerial Reconnaissance of Fires

A new project to test airborne infrared scanning devices was organized in Montana. The equipment being tested clearly reveals burning materials on the ground below, even when dense smoke completely obscures the view to the unaided eye. This capability can be valuable in planning and executing control operations on a large forest fire.

Lightning Reduced 38 Percent

Progress on Project Skyfire indicates that we may soon have a practical means of anticipating and reducing fires caused by lightning. Last year, for the first time, radar apparatus on a Montana mountain peak echoed back signals on thunderhead buildup, directions, and speed, and on wind direction and speed. Radar impulses, beamed out from Point Six Mountain 17 miles northwest of Missoula, Mont., bounced back to the screens of the U.S. Weather Bureau at Missoula Airport. In this way, the radar setup could tell much about storms over 25 million acres of National Forest land in Montana and nearby, and thus further alert firefighters to the possibility of lightning-caused fires.

Also in Montana, a series of randomized cloud seeding experiments are being carried out to determine the effect of overseeding with silver iodide on the occurrence of lightning. Techniques consist of heavy aerial seeding near the base of the cloud by means of an airborne silver iodide generator. Preliminary analysis of 2 years' data indicates an apparent reduction of 38 percent in cloud-to-ground lightning from storms treated in this way.

FOREST INSECT RESEARCH

More effort is being concentrated on finding biological means of forest insect control. To the extent that these methods become successful they will reduce the need for using chemicals. However, chemical control is still the major means by which most insects are kept in check.

Biological Pest Control

In the Southwest two important species of nematodes have been discovered on the fir engraver beetle, a serious pest of white fir in the western United States. Beetles infested with these nematodes cannot produce eggs or sperms, and eventually are killed. The nematodes are transported from tree to tree by the beetles and are deposited in the short galleries these beetles make before they die. Here the parasites infest beetle larvae produced from nonparasitized parents. Recent study of an outbreak of the fir engraver beetle on the Lincoln National Forest indicated it was controlled by these nematodes.

The hymenopterous parasite, *Agathis pumila* (Ratz.), an enemy of the larch casebearer, has been recovered in Idaho. This parasite was brought to this country many years ago from Europe, the native home of the casebearer, and established in infested stands of eastern larch in northeastern United States. There it has been quite effective locally in controlling populations of its host. When the casebearer was discovered infesting western larch recently, collections of the parasite were made in the East and shipped to Idaho for colonization.

Prospects are good for improved biological control of the European pine shoot moth in Lower Michigan as a result of recent success in establishing colonies of the introduced parasite, *Orgilus obscurator*, in six new locations in the region. In some of these places it has prevented up to 18 percent of the shoot moths from reaching the adult stage. These new colonies of the parasite are located in western Lower Michigan. Prior to their establishment, the parasite had been recorded only in eastern Lower Michigan.

In the Pacific Northwest, larvae of the spruce budworm, blackheaded budworm, western hemlock looper, western oak looper, and pandora moth were controlled under laboratory conditions when treated with commercial preparations of the bacterium *Bacillus thuringiensis*.

Chemical Control

Studies in California showed that it may be possible to control infestations of the Douglas-fir cone midge by spraying the duff under infested trees with either lindane, dieldrin, or Sevin at rates of 1.5 pounds of toxicant to 15 gallons of oil per acre. This method is possible because the midge pupates in the duff, and must crawl up through it when it reaches the adult stage before it can take flight. This insect is difficult to control in the larval stage because it feeds inside the cone where it is hard to reach with sprays. In laboratory studies, the number of adults emerging from duff treated with lindane was reduced by as much as 98 percent.

Treatment of thornless honeylocust with the systemic insecticide SD3562 has prevented defoliation by the mimosa webworm, *Homadula albizziae* Clk, for an entire season. Trees were treated by injecting 1.0 ml. (technical grade) of the material per inch of tree diameter into holes bored into the roots. After treatment, the roots were covered with soil to the original soil line and any disturbed sod was replaced.

Young cottonwoods in Mississippi have been protected from damage by twig boring insects through the use of the systemic insecticide Phorate. Before planting, cottonwood cuttings were dipped in carbon dust containing 44 percent of the insecticide, and supplementary applications in granular form were made as side dressings during the second and third growing seasons. At the end of the fourth growing season, the amount of pulpwood produced by the treated trees was 60 percent greater than that produced by untreated trees.

Biology and Ecology

Studies during the year revealed that the roundheaded pine beetle, a destructive pest of second-growth ponderosa pine in the Southwest, has a 1-year life cycle. Eggs are laid during October. The insect overwinters in the egg stage or as small larvae. Activity resumes the following spring and many larvae are full grown by mid-June. Pupation begins during mid-July. By late September most of the brood is in the adult stage and ready to emerge and start the cycle all over again. Information on life history details such as these are essential to the development of control measures.

FOREST DISEASE RESEARCH

Fumigation of Oak Wilt Logs

Elimination of oak wilt through fumigation, reported in 1960 on a laboratory scale, has now been perfected for field use. Exposure of infected logs to methyl bromide applied under a plastic cover was completely effective in two field tests under different exposure conditions in the Central States. These test results provide the basis for an economical and reliable means of eradicating oak wilt from contaminated material. Further confirmation and perfection of this technique should permit the export of certified fumigated oak logs. Many foreign countries now have embargoes on the importation of oak logs originating from within the range of oak wilt in the United States to avoid the risk of introducing this disease into their own oak forests.

Condensation Damage From Air Conditioning

The increased use of refrigeration to cool buildings in the Gulf States has created new condensation problems. Moisture accumulation in walls and floors leads to paint peeling, blistering, and molding; failure of plaster and rusting of metal lath; cupping and buckling of floors; loosening of tile; and decay of flooring and floor joists. Damage is mostly associated with wet crawl spaces and continuous low-temperature air conditioning. Research and observations show that condensation can be prevented by drying the crawl space and moderating inside temperatures, or by using a subfloor vapor barrier. Damaging condensation does not develop in the majority of air-cooled buildings. It does occur with sufficient frequency, however, to warrant consideration in the design, construction, operation, and maintenance of air-cooled buildings in hot, humid climates.

Biochemical Basis for Disease Resistance

One phenolic compound has been found in western white pine that appears to be associated with resistance to infection by the blister rust fungus. This compound has not yet been specifically identified, but Forest Service scientists are able to detect and recognize it when present. Refinement of this technique may well permit biochemical differentiation between resistant and susceptible trees and thereby eliminate the costly and detailed 7-year process now required to identify candidate resistant trees that will transmit resistance to their progeny.

Root Rot Survey in the South

Completion in 1962 of a comprehensive root rot survey extending from Virginia through Texas, during which over 84,000 trees were examined for evidence of *Fomes annosus* infection, disclosed several relationships of significance to forest management: losses were fairly low in the thinned plantations examined, averaging but 2.8 and 2.2 percent of the loblolly and slash pine trees, respectively, but ran as high as 30 percent in some plantations; losses in natural slash pine stands were very low; stands on former croplands were most seriously damaged; losses increased with increased frequency of and time since thinning; and were greater in stands on light soils, especially those with coarse-textured and deep A horizons, and where there were deep accumulations of litter. Research on various chemical treatments of freshly cut stumps to prevent original *Fomes annosus* invasion is continuing.

Progress in Root Rot Control

Poria weirii, a most destructive fungus pathogen of the roots of western forest trees, can survive for many years and then spread vegetatively to the living roots of the next forest generation. Recent research has shown that most infection centers in present stands are a result of such survival and spread, and not of new infection by spores. In buried blocks of infected wood, survival was found to be poorest where the blocks were rapidly invaded by soil micro-organisms antagonistic to *Poria weirii*. Further research to determine the specific factors that shorten the survival period of the pathogen, and the conditions that make these factors most effective, offers promise of eventual control.

RANGE AND WILDLIFE HABITAT RESEARCH

Carbohydrate Reserves in Bitterbrush

In central Washington, studies have shown that available carbohydrates in different parts of the bitterbrush plant have pronounced seasonal fluctuation. Lowest carbohydrate accumulation in tops occurred in May when the plants were in full flower, whereas depletion of root reserves did not occur until the seeds had matured some 6 weeks later. Grazing at this time would be most injurious. After the initial period of excessive energy demand, there is a steady accumulation of carbohydrate reserves in the tops and an extremely rapid buildup in the roots. This is followed by a gradual decline in food reserves during the winter months, presumably as a result of respiratory processes. Such knowledge of food reserves should be helpful in anticipating periods of greatest damage from grazing, in providing properly spaced and timed periods of rest in management plans, and in coordinating use by livestock and big game.

Litter Reduces Herbage Yield

Complete protection of native tall grass prairie in Iowa caused an excessive accumulation of litter which decreased vigor, growth rate, and yield of the vegetation. Prescribed burning following protection caused an increase in number and height of grass seedstalks, faster vegetative growth during the early part of the season, and greater herbage production. When organic matter was again allowed to accumulate, vigor, growth rate, and yield declined rapidly. However, where annual mowing and herbage removal prevented excessive accumulation of litter, vigor, growth rate, and yield decreased only slightly. This helps to explain why more forage is sometimes produced under grazing than with protection. However, more research will be necessary to explain the physiological processes that make herbage accumulation detrimental.

Fertilizing Range

In Florida, applications of rock phosphate on native range produced extremely favorable responses in terms of forage production, increase of desirable plants, and animal use. During the first year herbage yields were more than doubled on plots receiving 1 ton of phosphate per acre and

more than tripled on plots receiving 2 tons per acre. Grass seed production was also greatly increased. This may be a way to improving game habitat, particularly for quail. Cattle sought out and closely grazed the forage that grew on fertilized areas even eating species ordinarily of low palatability.

Herbicides Stimulate Shrubs

In northern Idaho, herbicides show promise for increasing the availability of certain tall-growing browse species now beyond reach of deer and elk on their winter range. Basal sprouting of Scouler willow and Saskatoon serviceberry can be stimulated by the application of 3 pounds acid per acre of 2,4-D or brush killer (2,4-D+2,4,5-T). But redstem ceanothus, a desirable browse, is completely killed by concentrations of these herbicides in excess of 1 pound acid per acre. Late summer spraying seems to have most promise for rejuvenating such winter ranges.

Cultivation Helps Prevent Grazing Damage to Trees

Cultivation of pine trees planted in an old carpetgrass field in south Georgia significantly increased growth of trees. By the end of the third growing season, trees that had been cultivated two or three times each year measured 32 inches in height, whereas those not cultivated measured only 24 inches. Cultivation, then, shortens the period during which trees may be injured by big-game or livestock grazing. In tests simulating browsing by deer, preliminary results indicate that as much as 75 precent of the foliage can be removed without affecting initial survival of slash pine seedlings; however, as little as 25-percent foliage removal adversely affects growth rate.

FOREST MANAGEMENT RESEARCH

Increasing Length of Tree Fibers

Fiber length, an important characteristic of pulpwood, can be increased by tree breeding. A study of the variability in fiber length in cottonwood showed that about half of the variation was associated with size and age of the tree, and that 30 percent was due to inheritance. On this basis selection of trees for long fibers might result in an average maximum length of 2.0 mm. in several generations compared to an average maximum of 1.28 mm. in the trees sampled.

Causes of Poor Yellow-Poplar Seed

The viability of seed of yellow-poplar is usually so poor that tree breeding projects will be handicapped if some procedure is not developed to increase the viability. To determine the causes, a detailed anatomical and cytological study was made during the period of pollination and fertilization. The results show that ineffective pollination is the cause of the low number of good seeds. The trees are usually self-incompatible; moreover, some trees were not always compatible with other trees. Also, rainy weather might restrict the activity of bees and reduce the amount of cross-pollination during the few days when pollination could occur. The implications are that compatible yellow-poplar trees will have to be found in tree breeding projects and that there may be little self-pollination in controlled breeding.

Blister Rust Treatment and Mycorrhizae

The antibiotic cycloheximide has been reported to be effective against the fungus causing blister rust in white pine. It was not known, however, whether treatment of seedlings with the antibiotic would kill the beneficial soil fungi that are necessary for formation of mycorrhizae on the seedlings. Laboratory studies showed that most of the mycorrhizae-forming fungi growing in sterile culture were inhibited by a concentration of 10 p.p.m. of the antibiotic. However, when applied to the stem of pine seedlings the chemical apparently was not translocated to the roots in amounts great enough to inhibit the fungal partners of the mycorrhizae. The results of this study suggest that proper use of the chemical for blister rust control wil not upset the necessary mycorrhizal development.

Fertilizing Trees Through Leaves

The possibility of supplying phosphorus to trees through the leaves was shown by a study of foliar application of phosphorus at Beltsville, Md. The upper needles of 3-month-old loblolly pine seedlings were dipped in a phosphate solution, tagged with radioactive phosphate. This dip simulated a spray such as might be done from an airplane. Radioactive phosphate was found in the root tips of the seedlings within 24 hours. Height growth after treatment was twice that of seedlings grown without the foliar dip.

Terpene Chemistry of Pines

The chemical composition of the gum turpentines of the pines is of interest not only to the chemical and pharmaceutical industries but also to forest geneticists and botanists. In studies of the pines, knowledge of the terpene constituents may provide important clues to relationships among species. Also, knowledge of chemical makeup may reveal possibilities of breeding for insect resistance in pines. A new book brings together nearly 30 years of research and the information in about 50 publications. It lists the terpenes found in 101 pine species or varieties and discusses the significance of the common occurrences of the terpenes. This book, *Composition of Gum Turpentines of Pines*, Technical Bulletin 1239, represents a major contribution to scientific knowledge.

Selected Cottonwoods Make Rapid Growth

In Mississippi introduced Euramerican hybrid poplars have, with one exception, proved inferior to native cottonwoods in survival and growth and none has proved superior. Several locally selected clones are making outstanding early growth; the best for any individual tree has been 30 feet in height and 4.8 inches in d.b.h. in the first 2 years.

Rodents May Determine Stand Composition

When spruce-fir stands are cut, balsam fir often predominates in the subsequent regeneration. In a study to determine reason for this, white spruce and balsam fir seed were exposed over a 5-week period during fall in feeders designed to keep out birds and large mammals. The small mammals showed a strong preference for spruce seed, taking fir seed only when the supply of spruce seed was exhausted. On two 1-acre plots, red-backed voles and deer mice consumed or stored about 26 pounds of spruce seed and 1 pound of fir seed in the 5-week period. These results indicate that small mammal preferences may be an important factor in determining stand composition in spruce-fir forests.

Best Trees Picked in Nursery

The selection of outstanding seedlings in the nursery appears to be a means of identifying trees of better genetic constitution. After 4 years in the plantation, loblolly and slash pines selected in the nursery were 16 and 19 percent taller, respectively, than the controls. A 3-man selecting crew was able to look over a nursery of 30 to 50 million seedlings in a day in search of these apparently superior seedlings, some of which will be used for breeding material. The effectiveness of nursery selection was also indicated in a study in California, where results after 15 years in a progeny study showed that 2-year height in the nursery could be used to predict performance. Heritability studies indicated that about 39 percent of the variation in 15-year heights was attributable to genetic control.

WATERSHED MANAGEMENT RESEARCH

Erosion and Sediment Reduced

Planting barley on closely spaced contours immediately following a fire has been successful in stabilizing steep slopes. In spite of adverse weather, fall planted barley was 2 inches tall less than 2 weeks after planting and formed a substantial barrier to overland flow and soil erosion. Sediment in the streams was only a fraction of that from untreated watersheds or those treated in other ways. During four major storms in 1962, sediment concentration from untreated watersheds on the burned-over San Dimas Experimental Forest ranged on the average from 31,000 to 159,000 parts per million, the concentration depending primarily on rainfall intensity. A good seed crop produced an excellent volunteer stand of barley the second year, giving 2 full years of valuable watershed protection while native vegetation was becoming reestablished following the fire.

Clue to Flood Control

An experiment in central Ohio indicated that deep percolation of water, and a vegetation cover that will readily utilize water in the soil, are essential on watersheds being managed for flood control. The studies showed that 50 to 90 percent of simulated rain falling on a forested area flowed out from subsurface layers within 4 to 6 hours and became part of the streamflow. Flow from soil depths below 16 inches was rather uniform regardless of intensity or duration of the "storm," but from the upper 16 inches flow was erratic and closely dependent on the intensity and duration of rainfall and the amount of moisture already in the soil. When soil moisture was relatively low before rainfall, most of the flow came from the deeper layers; and the greatest depths, overlying water-impeding layers, must be wet before flow will occur at the shallower levels. Vegetation that utilizes water in the upper soil layers makes space available for temporary storage of rainwater.

Measuring Transpiration

Two badly needed techniques for measuring the use of water by vegetation, particularly shrubs and trees, have been developed. In one technique, a polyethylene tent is placed over a plot of vegetation and the difference in the measured moisture content of the incoming and outgoing air is used to compute the quantity of water transpired by the vegetation. The other technique is designed to measure the flow of sap in the woody plant itself. The principle is to measure the rate of movement of a heat pulse from one point to another in a tree or shrub, through the sap stream. By solving a series of equations the velocity of sap flow itself can be computed, and this used as a measure of water use by the plant.

Effects of Roads on Watershed

On a small watershed within the H. J. Andrews Experimental Forest, Oreg., the construction of roads before logging has resulted in an increase in later summer streamflow and a temporary increase in sediment in the stormflow, but no increase in the peak flow of the stream. Clearing about 8 percent of the area of an experimental watershed gave 19.3 percent greater late summer flow in 1959, 12.4 percent greater in 1960, and 12.8 percent greater in 1961. Comparisons of sediment yields from this watershed, following road construction, with an undisturbed control watershed showed a considerable increase in suspended sediment in the stream of the watershed with roads,

but a tendency for the disturbed areas to heal rather rapidly.

Burning Increases Runoff and Sediment

Large increases in runoff and sediment yield have resulted from accidental burning in Arizona chaparral. Prefire calibration of the Three-Bar experimental watersheds in Arizona showed only 3 inches of runoff and total sediment yields of 50 tons per square mile from a total accumulated precipitation of 67 inches. Total accumulated postfire precipitation of 53 inches, however, produced 16 inches of runoff and 22,000 tons of sediment per square mile of watershed. Indications are that if the severe erosion can be prevented by fast establishment of a shallow-rooted vegetation, significant increases in water yield are possible by removal of chaparral.

FOREST ECONOMICS AND MARKETING RESEARCH

Forest Survey Aids Industrial Expansion

The nationwide Forest Survey provides information on the area, location, and condition of the Nation's forest resources, timber volumes, rates of timber growth, cut, and mortality, and other resource information basic to public and private forestry programs. Resurveys are made periodically in all States to provide up-to-date information and to determine trends in timber supplies, forestry problems, and forest industrial development opportunities, especially in rural areas in need of economic development.

The Forest Survey contributed essential information, for example, regarding the feasibility of plywood production from southern pine by the new plywood industry planned in the South. The Survey showed an upward trend in supply of large size, high-quality southern pine in the west Gulf region and the availability of timber suitable for a new plywood industry. Wood samples collected in the Forest Survey and sent to the Forest Products Laboratory provided data on strength and other wood quality characteristics needed to determine which portion of the southern pine resource is suitable to meet strength requirements for construction grade plywood.

Aerial Film Types Tested

One result of a continuing program of survey techniques research was development of guides for photo classification of several kinds of two-story stands in the Douglas-fir subregion in the form of a series of stereograms. These guides not only expedite mapping of such stands on a consistent basis, but also provide graphic definitions of forest maps in that region. Studies of films used in aerial surveys showed that significantly more accurate and more consistent photointerpretation of tree species could be accomplished with color photographs than with panchromatic photographs. Results of another study indicated that aerial photographs of medium scale (1:12,000) were generally as satisfactory as larger, more expensive scales for mapping and for planning timber sales required in the management of ponderosa pine forests.

Outlook for Naval Stores

A marketing study just completed provides the most complete appraisal of the U.S. naval stores industry undertaken in many years. Striking changes have occurred in production of rosin from each of the three major U.S. sources, whereas total domestic production has increased little since the early 1900's. At that time all rosin was produced from pine gum, compared with 23 percent in 1961. Production of steam-distilled wood rosin from southern pine stumps started about 1910, increased to 70 percent of total production in 1955, then declined to 54 percent in 1961. Commercial production of tall oil rosin from sulfate pulping liquors started in 1949 and has increased to 23 percent of total rosin output in 1961.

Substantial further changes are expected in response to future domestic and foreign supply and market conditions. During the 1960's a projected 34-percent decline in wood rosin output is likely to be more than offset by increases of 75 percent and 65 percent respectively in domestic tall oil rosin and gum rosin production. Results of this study are of major importance to producers and consumers of naval stores throughout the world, and to industrial and forestry agencies concerned with management of southern pine resources.

Factors Motivating Small Woodland Owners

Results of recent studies of small woodland owners in the Upper Peninsula of Michigan show that absentee owners who hold land primarily for recreation use are increasing in number. In southern Michigan wage earners, business and professional people, and other nonfarmer groups together represent the largest part of the small owner population. Urban expansion in southern Michigan has changed forest use and widely influenced owner expectations and land-use plans. Such factors must be considered in developing programs intended to promote better forest management among private owners.

FOREIGN FORESTRY SERVICES

The Forest Service research organization also administers a number of foreign forestry activities that serve to extend forestry knowledge and interest worldwide and to develop closer contacts with forestry programs in other nations.

Training Foreign Nationals

Though the number of individual and group programs increased only slightly over the previous

year, the number of foreign nationals went up about 25 percent. Project programs, which are financed by the Agency for International Development (AID) and the Food and Agriculture Organization (FAO) of the United Nations, increased. Nonproject programs—those sponsored through cultural exchange programs of the U.S. Department of State, private foundations, foreign governments, and individuals—decreased. AID sponsored 87 programs for 146 persons. Eleven persons took part in individual programs sponsored by the FAO. The remaining 49 nonproject programs included 110 participants. Thus a total of 147 training programs and study tours were conducted for 267 foreign nationals from 58 countries. Eighty-four were from Asia, 80 from Africa, 76 from Europe, and 17 from South America. The other persons came from Australia, New Zealand, and Jamaica.

Those scheduled for training in forestry and related curriculums at colleges and universities accounted for 43 persons, a decrease from 48 in 1961. Fifteen took work leading to bachelor and 20 to master degrees.

Technical Consultation and Support

Requests from abroad for information and materials rose from 120 in 1961 to 248 in 1962. These requests, from 57 countries, were for assistance in procuring seed and pollen, technical publications, and for technical information on a wide variety of subjects relating to forestry, wild-land management, and watershed management.

The number of forestry projects under the United Nations Special Fund increased sharply. Since the program began in 1958, 10 UNSF forestry projects had gone into operation. In 1962 6 more were approved, and requests for an additional 12 had been received by the United Nations Special Fund Office. Providing capable forestry technicians for these projects was, and continues to be, a major problem. Foreign Forestry Services is cooperating closely with FAO-Rome in recruiting competent U.S. specialists for these assignments.

Another interesting development has been the increase in demand for foresters for the Peace Corps. Although at the outset it was not expected that countries would request many Peace Corps foresters, the contrary has proved to be true. By the close of the year, 26 professionally trained foresters were already overseas with the Peace Corps.

International Organization Activities

Planning and assistance in the conduct of, and arrangements for, meetings of international groups constituted a major accomplishment of Foreign Forestry Services in 1962. The Forest Insect and Disease Working Group and the Forest Fire Control Working Group of the North American Forestry Commission met in Washington. Two official delegates represented the United States in the Eighth Session of the Latin American Forestry Commission held in Santiago, Chile, and U.S. foresters attended meetings of several scientific bodies in Europe and Africa. Preparation for the conduct of the FAO Fifth Wood Technology Conference, to be held at the Forest Products Laboratory in Madison, Wis., during 1963, and an FAO Forest Fire Control Study Tour and Seminar scheduled for 1964, for both of which the United States will be host, advanced to the planning stage. Forest Service staff members also assisted in planning for the First World Food Congress to be held in Washington during June 1963.

During the late summer the initial distribution of the Proceedings of the Fifth World Forestry Congress was made. Approximately 2,100 sets, each weighing 15 pounds, were distributed to 67 countries around the world.

Support Functions

Many activities of the Forest Service support on-the-ground resource work; they may be called the motor or nervous system of the organization.

Management people must plan and direct and unify overall resource and other work with businesslike procedures, and provide central direction for the work of the Forest Service.

Personnel workers must recruit, interview, and hire new people; they must motivate the regular staff to more training and greater efficiency.

Information and education work—reports of activities, publications, and exhibits—must give the people the facts they need, without which they would not understand what the Forest Service does or why; without which forestry and related conservation would suffer.

Accountants, fiscal officers, and budget and finance people must keep financial operations in order.

These and many other activities keep the Forest Service running smoothly and prepare it for even more complex jobs in the future.

ADMINISTRATIVE MANAGEMENT

Service to the Public Is the Key

Service to the public is the true measure of Forest Service program management and accomplishment. How well the Forest Service serves is dependent upon people of the Forest Service who carry out programs. To do their best, these people must follow orderly and efficient management methods. Forest Service personnel develop and perform in proportion to efficiency of the management methods. Conversely, the management methods are effective in proportion to how well they are oriented to the needs of Forest Service people.

To foster this concept of public service and employee-managerial relationship, action was intensified in the management fields to further improve management of men, materials, and equipment towards achieving economy of operations and increasing public service. For example, 3 years ago, a uniform system of work planning was developed. All Forests use the system to organize manpower, equipment, and material to accomplish financed work that emphasizes efficient accomplishment of stated program objectives with allotted funds. In 1962 the work planning system was fully integrated with the financial budget and accounting systems.

Automation Increasing

More than 90 program and service jobs are now automated. This has brought estimated net savings of a million dollars annually, increased efficiency in meeting time schedules, and higher quality of end product than was previously obtained under manual methods.

Management Improvement

More than 30 management studies and projects were completed and results put into effect. Seventy-two additional projects are underway, all aimed at improving operations, reducing costs, and making better use of manpower. Our studies system was coordinated with the Department's new Management Improvement Project System.

Forest Service personnel were given the necessary training to apply management study results and improved techniques. Training guides were developed for use in developing employee managerial abilities, and training programs were realined to emphasize management aspects.

Heat-Produced Electricity

Physics and management sometimes go hand in hand, for new instruments often result in greater efficiency and less cost.

Illustrations of the connection between management and science can be found in the year's work, particularly in laboratory testing of the thermoelectric generator and the fire-weather telemeter.

The generator produces electricity directly from heat, for example, from a propane flame. In 1821 Seebeck, of Berlin, discovered that upon heating the junction point of dissimilar metals, an electric voltage is developed across the open ends. The Seebeck principle is the same one used in the safety device that shuts off gas in water heaters when the pilot light goes out.

It is expected that modern, more efficient Seebeck generators employing recently investigated semiconductor materials can be adapted to Forest Service use to provide a practical source of electric power for mountaintop relay stations, necessary when radio transmission is blocked by high terrain.

Expensive conventional electric power supplies will therefore not be needed. For example, dry cells are costly, as are also the conventional methods of charging storage cells; and in remote forest areas commercial sources of electricity are usually not available.

Field tests are being carried out in the Rocky Mountain and west coast regions. The equipment is expected to permit year-round use of radio systems that have customarily been discontinued during the winter months.

Weather Telemeter

The fire-weather telemetering system also has many automatic features. With this system, for-

esters expect a more representative sampling of on-the-ground conditions that will lead to a more accurate fire danger rating.

Since the instruments of the system are designed for unattended operation, the usual limitations of location do not apply. This makes possible the better sampling. The control unit at a Ranger Station will monitor up to 10 instrument stations. These record wind measurements, rainfall, temperature, and humidity. The information relayed to the control unit is automatically typewritten.

Management Principles

Two major management publications were issued during the year, designed to give all personnel a better grasp of basic Forest Service management principles. They are "Organization and Management in the Forest Service" and "Management Systems in the Forest Service."

The former booklet gives employees the highlights of management and management processes, minus the detailed material in manuals. The latter is to familiarize new employees with Forest Service management systems, their correlations, and their use in meeting program goals. It will also aid quicker comprehension of material in the manuals. In addition, both publications are meant to give a more concise account to Government agencies, foreign trainees, and others interested in the Forest Service system.

ADMINISTRATIVE SERVICES

Training Service-wide in how to make contracts was intensified. Contracting for design and construction of research buildings was carried out, and construction by contract of fallout shelters at field locations was started. Designs for all laboratories in the fiscal 1962 budget were completed and all buildings contracted for construction before June 30, 1962.

Progress was made in locating Forest Service personnel in modern offices, mostly at Ranger Stations and Supervisor headquarters, where most of the tourists and public meet Forest Service people. Much of the leasing is done through the General Services Administration on a 5- to 10-year basis; it is also carried out through agreements with builders who upon completion of buildings lease out office space.

Guides have been prepared to aid in acquiring office space. They include suggested floor layouts and square footage allowances for all employees. The guides should prove useful in planning economical use of space. This is important because office space rentals have been averaging about $3.75 per square foot a year.

PERSONNEL MANAGEMENT

A modernized program to improve the management of human resources within the Service was begun during the year. The Forest Service cooperated closely with the Department's Personnel Research staff on several personnel research projects. The principal project seeks a system of identifying, measuring, and inventorying skills and capabilities to improve employee selection, placement, and development programs. This research will be adapted to automatic data processing on a long-term basis.

Tests are underway, for instance, on adapting machine "memory" to holding and releasing routine background information about employees—experience, education, and performance. Often such basic material is scattered in separate files.

Computer research, however, is only a part of several principal research efforts underway. Others relate to improvement of career programs and performance evaluation.

TRAINING

Fire Simulator—New Training Device

Among the new developments during the year was a fire simulator, still being tried out, which is a device to provide better training for potential fire bosses and firefighters. By means of three projectors and two tape recorders, the trainee is exposed to a series of conditions similar to those in actual forest fires. These conditions can be controlled at will by the operator of the simulator, and the trainee responds to the conditions with his best judgment. If his judgment is wrong, results of his error will also show up all around him, to drive the mistake home, and so teach him to avoid similar mistakes in an actual fire.

Ground equipment, aircraft, and crews or screens can be moved about at will by means of a special symbol-projector. Seated in a booth with telephone and radio at his disposal, the trainee determines what men and equipment should be ordered and deployed to combat the fire. His decisions are relayed to a team of forest fire control experts, consisting of an umpire, a role player, and the operator of the simulator.

Following its first tryout in Washington, the fire simulator was moved to the Continental Divide Training Center in New Mexico and put to use in the National Fire Generalship training course.

A new training film, "Fire Boss," was released, which together with the simulator, should be a major contribution to overall fire control.

Fire Training Courses

National training courses in both fire generalship and advanced fire behavior were again held before the main fire season, while at all levels training was maintained to improve the quality and safety of fire control activities. The second annual National Fire Generalship Course, a 3-week course beginning in February and held in Marana, near Tucson, Ariz., was attended by about

40 fire-boss trainees. Other fire training, which began either in January or February, included the Fourth Annual National Fire Behavior Training Course and a National Fire Training Workshop, both held in San Dimas, Calif.

New Training Center

The Continental Divide Training Center, located in a forest and mountain setting 35 miles from Gallup, N. Mex., was established during the year. Using an installation declared surplus by another Federal agency, the center will accommodate about 75 persons at one time. It will be used for the training program in the Southwestern Region, and also as a Service-wide training facility for national training meetings. In addition, it will serve as a centralized training "laboratory" for the testing of new techniques, methods, and equipment to benefit training programs elsewhere in the Service.

Better Written Communications

Forest Service people were training themselves to write better letters and clearer directive material in manuals and handbooks. About 5,500 "better writing" self-help packets were furnished on request to Regions and Stations, and 175 people in the Washington Office studied the review course in better writing. The packet consists of workbooks on improving letters and directives, as well as sample exercises and suggestions for group discussion.

Do-It-Yourself Learning Devices

Personnel staff members began to use a new educational concept called "program learning," whereby the trainee teaches himself. The instruction devices range from textbooks and mechanical gadgets to more complex machines, some of which are electronic and cost from about $10 to $1,200. Material arrangement and machine procedure is such that the trainee can learn at his own rate of speed. He gets answers to his responses to questions almost immediately. If his response is correct, the answer he is led to, verifies his own; if wrong, he is led to a correct one, thus avoiding any fixation of the wrong answer in his mind.

The staff also worked with the Audio-Visual Branch of the Washington Office Information and Education Division in the film production of "Potential Unlimited," for supervisors charged with training people.

The personnel staff arranged again for graduate study. Of the professional personnel in research, 16 percent took courses full- or part-time. For the second year, persons other than research staff were selected for full-time study: seven in management and three in fire control.

CIVIL DEFENSE

Worldwide tension, heightened by the Cuban emergency, further stimulated defense preparedness in Forest Service plans. Action was taken to achieve a better level of readiness as an integral part of regular activities.

The Forest Service is responsible for leadership and direction of the Rural Fire Defense program covering all rural land throughout the Nation. This involves coordinating the efforts of all nonurban fire suppression agencies to meet the potentially catastrophic mass fire situation that would follow nuclear attack.

Much progress was made in updating statewide fire suppression plans through the combined efforts of State and Federal agencies. Rural families and fire suppression organizations were provided with the booklet, "Rural Fire Defense—You Can Survive." This was a cooperative undertaking of the Forest Service and the Department of Defense, Office of Civil Defense, which entailed the printing of 1,200,000 copies, with distribution through State Extension Services.

A second National Staff and Command Course for rural and urban fire control personnel was held in Battle Creek, Mich. Courses were conducted by the National Fire Defense Advisory Committee and sponsored by the Office of Civil Defense. Of the 32 trainees who attended, 13 were from the Forest Service.

Also in cooperation with the Office of Civil Defense, the Forest Service started a pilot dual-purpose fallout shelter program, under which shelters were constructed and stocked at 11 field installations across the Nation. These have furnished data and experience useful in future shelter construction as a part of the national program.

Four fire research projects of special interest to the Department of Defense, Office of Civil Defense, were approved and started. Three of these studies will extend over several years: they cover mass fire analysis and weather patterns throughout the Nation.

National defense comes close to home on many National Forest areas where radar, communications, and missile sites are operated under special use permits. In Oregon, Air Force rescue teams received parachute training side by side with Forest Service smokejumpers. And occasionally, National Forest areas provide the terrain for special military field maneuvers, which augment the training provided within military reservations.

Radiological monitoring capability throughout the National Forest System was expanded to 815 fully equipped stations. Training in monitoring was likewise enhanced to provide a total of 120 instructors and 1,200 trained monitors to assure operability and safety in a nuclear emergency.

The Forest Service participated in the Department's strengthened efforts to protect its own personnel from radiological fallout and to insure continuity of operation in a national emergency. A wallet-sized foldout card, "Survival Self-Helps," and other essential information were distributed to

all Forest Service employees and adult members of their families. The foldout card was later adapted for Department-wide distribution. Relocation instructions to all personnel were refined, and essential records and reference materials were prepared for storage at emergency relocation sites. Training was given in shelter survey, medical self-help, and survival preparedness.

Throughout the year Forest Service personnel served on 50 USDA State and about 800 County Defense Boards along with appointees of other agencies in the Department.

INFORMATION AND EDUCATION

Informing People

Publications, films, exhibits, and on-the-ground information services carried information to the public about forestry, conservation, and the National Forests. A significant forestry publication of the year was the three-volume *Proceedings of the Fifth World Forestry Congress*. The *Proceedings* are like a small library of world forestry knowledge, contained in 449 technical papers, discussions, speeches, and activities of the Congress, which met in Seattle, Wash., in the summer of 1960. After 2 years in preparation, the *Proceedings*, in the three official languages of the Congress, were distributed in the fall of 1962 to land managers, government agencies, and libraries around the world.

Many Requests Pour In

Requests indicate the demand for information. Received by the Washington Office alone were 89,774 written requests for information and publications, an increase over the 58,066 in 1961. Also there were 8,000 telephone inquiries against 6,500 the year before. Many of these requests were from students and educational institutions.

Visitor Information Service

Not only do these figures account for only a small part of the informational requests of all Forest Service offices—about one-eighth—they also don't take in on-the-ground queries made by visitors to the National Forests. The questions range in subject from earthquakes and glacial formations to local history. The Visitor Information Service, now in its third year, is providing more on-the-spot information to visitors.

Informational Literature

Publications issued during the year included 26 research pamphlets in the USDA numbered series, and many others released locally by the Forest Service experiment stations—all carrying forestry research facts to the public, resource managers, and industry where it can be applied to improve the resources and the economy.

Booklets for the layman and landowner included "Forest Recreation for Profit," which has had two printings totaling 100,000 copies. Another booklet for better use of private forest land was "Managing the Family Forest." For the outdoor recreation public, two popular booklets were released: "Camping," and "Skiing."

Films and Exhibits

Five films were produced for training purposes. The films dealt with personnel work and fire control.

Another facet of public information work is the design and construction of exhibits. Two portable exhibits were constructed: "Timber for Sale," and "Range Management on National Forests and National Grasslands." Seven Forest Service exhibits were shown throughout the country, including "Timber for Sale," first displayed in Chicago in October, when an estimated 50,000 persons attended the National Retail Lumber Dealers Association annual convention.

Two new permanent exhibits were set up: One on genetics at the Forest Genetics Laboratory of the Southern Forest Experiment Station, Gulfport, Miss., and the other on multiple use management at the Ghost Ranch Museum, Abiquiu, N. Mex.

PROGRAMS AND LEGISLATION

Legislation

A multipurpose bill to alleviate administrative problems was one of the major Forest Service legislative proposals enacted into law in 1962.

Designated as Public Law 87–869, this act has 10 independent sections. Among other things, it removed the ceiling on the Forest Service working capital fund, authorized the Secretary of Agriculture to exchange lands under Forest Service jurisdiction in cases for which no exchange authority had existed, and removed the 20-year limitation on authority to quitclaim where lands were acquired in error.

Other legislation affecting Forest Service activities, passed during the 2d session of the 87th Congress, included: Authority to provide relief for certain residential occupants of invalid mining claims upon which valuable improvements had been placed (P.L. 87–851); an increase in authorization for Cooperative Forest Management (P.L. 87–680); increase in authorization for keeping a nationwide Forest Survey current (P.L. 87–685); addition of certain lands to the Wasatch National Forest (P.L. 87–661); authority to add to the National Forests those lands within the exterior boundaries thereof acquired under section 8 of the Taylor-Grazing Act (P.L. 87–524); and addition of Title III Bankhead-Jones Farm Tenant Act lands to the Pike, Carson, and Santa Fe National Forests (P.L. 87–631).

The Forest Service followed, on a day-to-day basis, about 800 bills which would affect its activities. It prepared or reviewed legislative reports

on 142 bills and proposals and provided a number of Congressmen with legislative drafting service. Testimony was given before congressional committees on 20 bills, exclusive of appropriation bills. Twenty-five bills of direct interest to the Forest Service were enacted during the year.

Program Planning and Special Projects

Divisional activities include a wide variety of special studies and assignments relating to broad aspects of resource management and policy. These activities typically were undertaken in close coordination with other Forest Service Divisions and with other agencies and Departments. Management of the National Forests has been involved in the Division's work with the staff of the National Recreation Advisory Council and in preparation of a major Forest Service report on National Forest recreation. Other studies dealt with possibilities of getting proper distribution of land among the various resource uses; broadening the recreational opportunities on private lands and waters; improving the conservation and management of land, forests, and waters; coordination of National Forest recreation ways and the proposed system of National Parkways; and multiple-use opportunities in the northern lands of the Lake States and in the Appalachian region.

INTERNAL AUDIT

In 1962 internal audits were completed for the Rocky Mountain, Intermountain, Southwestern, and North Central Regions and for the Intermountain, Pacific Northwest, Southeastern, and Northeastern Experiment Stations. An internal audit was made of the Forest Service directives system. Internal audits were also made of 50 National Forests by the three field offices.

On December 21, 1962, Secretary Freeman transferred all internal audit and investigative activities to the Office of the Inspector General. This change was made to provide essential flexibility, maximize effectiveness of the audit and investigative functions, and serve all levels of management in the Department. The former Forest Service Internal Audit staff (now a division) will continue to audit Forest Service programs and activities.

BUDGET AND FINANCE

Receipts and Expenditures

Receipts from the sale or use of National Forest resources amounted to $112,661,039 in fiscal year 1962. Sources of the receipts were as follows:

Timber	$106, 158, 478
Grazing	3, 196, 128
Other	3, 306, 433
Total	112, 661, 039

Included in these figures is $3,548,809 received from National Forest revested Oregon and California Railroad grant lands. Additional resource revenue included $1,512,929 from National Grasslands and land utilization areas (title III of the Farm Tenant Act).

Other sums received included: $567,411 contributed by cooperators and timber purchasers for cooperative work on National Forest programs; $16,252,394 set aside for timber sale area improvements; $7,699,061 set aside for brush disposal; $1,424,974 from miscellaneous receipts; and $9,545 for restoration of forest lands and improvements.

Receipts from all sources, therefore, totaled $140,127,353. In addition, timber purchasers built roads valued at $48,896,625 incident to harvest of timber. Collections by other agencies for power licenses, mineral leases, and permits on National Forest land of public domain origin totaled about $11,476,000. Operating expenses for National Forest programs, National Grasslands, and land utilization projects totaled $154,667,837. Depreciation on roads, trails, and other improvements amounted to an estimated $34,803,939. For the fiscal year, receipts and other income exceeded operating expenditures and other charges by $11,028,202.

Expenditures for other Forest Service activities included $21,738,901 for cooperative State and private forestry programs, and $24,682,832 on forestry research. Both figures include expenditures from cooperator contributions, which amounted to $1,966,422 in cooperative State and private forestry programs and $1,018,633 in forestry research. The Forest Service also received $19,604 in royalties from the Smokey Bear forest fire prevention program.

Under the act of May 23, 1908, as amended, the Forest Service pays 25 percent of the National Forest net receipts to States for schools and roads within counties having National Forest land. In fiscal year 1962, based on fiscal 1961 receipts, this payment was $25,056,348. Under the act of June 20, 1910, Arizona and New Mexico school funds received $99,211. Under the act of June 22, 1948, Minnesota received $123,550. Counties received $420,714 from calendar year 1961 receipts of National Grasslands and land utilization areas under the act of July 22, 1937.

By law, the Forest Service retains 10 percent of receipts from National Forest resources, except receipts from revested Oregon and California lands, for expenditure on roads and trails within the National Forests. This amounted to $10,024,470 in fiscal year 1962.

Fiscal Management

A new system of self-inspection of portions of fiscal activities was set up at regional headquarters that provides local and agency headquarters review at substantially less travel cost and more acceptable results.

Statistical Tables

TABLE 1.—*National Forest and other lands administered by the Forest Service, as of June 30, 1962*

State and Commonwealth	National Forest [1]	National Grassland	Land utilization projects	Total
	Acres	*Acres*	*Acres*	*Acres*
Alabama	631, 535	0	0	631, 535
Alaska	20, 741, 985	0	0	20, 741, 985
Arizona	11, 397, 923	0	0	11, 397, 923
Arkansas	2, 409, 347	0	0	2, 409, 347
California	19, 946, 297	0	19, 115	19, 965, 412
Colorado	13, 703, 438	612, 036	9, 318	14, 324, 792
Florida	1, 074, 981	0	0	1, 074, 981
Georgia	777, 381	0	9, 340	786, 721
Idaho	20, 298, 656	47, 599	0	20, 346, 255
Illinois	211, 021	0	0	211, 021
Indiana	120, 381	0	3, 180	123, 561
Iowa	4, 649	0	360	5, 009
Kansas	0	107, 114	0	107, 114
Kentucky	459, 991	0	0	459, 991
Louisiana	591, 409	0	0	591, 409
Maine	49, 556	0	465	50, 021
Massachusetts	1, 651	0	0	1, 651
Michigan	2, 558, 342	0	6, 795	2, 565, 137
Minnesota	2, 766, 117	0	0	2, 766, 117
Mississippi	1, 134, 001	0	0	1, 134, 001
Missouri	1, 360, 661	0	12, 938	1, 373, 599
Montana	16, 635, 677	0	0	16, 635, 677
Nebraska	245, 409	94, 307	0	339, 716
Nevada	5, 057, 987	0	0	5, 057, 987
New Hampshire	678, 046	0	0	678, 046
New Mexico	8, 611, 897	133, 183	290, 633	9, 035, 713
New York	0	0	13, 747	13, 747
North Carolina	1, 124, 152	0	0	1, 124, 152
North Dakota	520	1, 104, 330	0	1, 104, 850
Ohio	108, 960	0	0	108, 960
Oklahoma	224, 674	46, 211	0	270, 885
Oregon	15, 359, 471	105, 925	0	15, 465, 396
Pennsylvania	471, 081	0	0	471, 081
South Carolina	587, 216	0	0	587, 216
South Dakota	1, 121, 151	864, 458	15, 056	2, 000, 665
Tennessee	594, 770	0	1, 212	595, 982
Texas	657, 997	115, 243	2, 025	775, 265
Utah	7, 916, 041	0	0	7, 916, 041
Vermont	232, 134	0	0	232, 134
Virginia	1, 450, 435	0	0	1, 450, 435
Washington	9, 688, 449	0	0	9, 688, 449
West Virginia	905, 209	0	0	905, 209
Wisconsin	1, 467, 624	0	1, 290	1, 468, 914
Wyoming	8, 570, 565	573, 250	0	9, 143, 815
Puerto Rico	27, 889	0	27	27, 916
Total	181, 976, 676	3, 803, 656	385, 501	186, 165, 833

[1] This column includes all lands administered by the Forest Service, except National Grasslands and Land Utilization Project Lands which are shown separately.

TABLE 2.—*Area of commercial timberland and volume of timber in the National Forests, Jan. 1, 1963*

State [1]	Unreserved commercial forest land	Sawtimber			Other products [2]	All products	
		Cubic feet	Measured by local scale	Converted to international ¼-inch rule		Cubic feet	Measured by local log scale [3]
	Thousand acres	*Million cubic feet*	*Million board feet*	*Million board feet*	*Million cubic feet*	*Million cubic feet*	*Million board feet*
Alabama	617. 4	353	1, 538	1, 784	133	486	2, 203
Alaska	5, 341. 2	29, 176	157, 617	171, 802	3, 198	32, 374	173, 607
Arizona	2, 470. 2	2, 729	15, 285	17, 579	640	3, 369	18, 485
Arkansas	2, 535. 1	1, 092	4, 824	5, 596	494	1, 586	7, 294
California	8, 210. 7	27, 150	150, 832	159, 882	1, 456	28, 606	158, 112
Colorado	8, 375. 2	8, 898	36, 969	43, 993	5, 297	14, 195	63, 454
Florida	1, 029. 5	151	665	771	331	482	2, 320
Georgia	740. 8	538	2, 311	2, 681	200	738	3, 311
Idaho	11, 180. 4	14, 434	73, 235	85, 685	3, 793	18, 227	92, 200
Illinois	187. 8	51	319	367	70	121	669
Indiana	112. 0	26	162	186	34	60	332
Kentucky	440. 8	239	1, 273	1, 273	222	461	2, 383
Louisiana	557. 8	345	1, 542	1, 789	122	467	2, 152
Michigan	2, 415. 0	263	1, 649	1, 896	863	1, 126	5, 964
Minnesota	2, 154. 4	125	781	898	1, 171	1, 296	6, 636
Mississippi	1, 107. 4	757	3, 392	3, 935	241	998	4, 597
Missouri	1, 311. 7	208	1, 299	1, 494	401	609	3, 304
Montana	10, 293. 7	10, 534	49, 941	58, 431	7, 602	18, 136	87, 951
Nebraska	43. 0	9	24	29	30	39	174
Nevada	155. 4	530	3, 224	3, 707	131	661	3, 879
New Hampshire	532. 0	170	814	814	733	903	4, 479
New Mexico	2, 858. 7	1, 573	8, 812	10, 134	665	2, 238	12, 137
North Carolina	963. 4	528	2, 279	2, 644	171	699	3, 134
Ohio	87. 9	24	145	167	31	55	300
Oregon	12, 902. 9	49, 875	249, 370	309, 218	3, 461	53, 336	266, 675
Pennsylvania	451. 1	173	1, 056	1, 056	415	588	3, 131
South Carolina	543. 2	387	1, 700	1, 972	99	486	2, 195
South Dakota	1, 114. 9	679	2, 879	3, 426	289	968	4, 324
Tennessee	568. 3	303	1, 321	1, 532	158	461	2, 111
Texas	620. 8	598	2, 720	3, 155	177	775	3, 605
Utah	2, 630. 9	2, 230	12, 257	14, 095	919	3, 149	16, 852
Vermont	224. 0	220	945	945	180	400	1, 845
Virginia	1, 179. 0	474	2, 262	2, 262	676	1, 150	5, 642
Washington	5, 415. 1	24, 691	123, 490	153, 128	2, 225	26, 916	134, 615
West Virginia	751. 2	344	1, 482	1, 482	332	676	3, 142
Wisconsin	1, 366. 2	140	876	1, 007	553	693	3, 641
Wyoming	2, 970. 4	3, 392	15, 377	18, 299	1, 979	5, 371	25, 272
Total	94, 459. 5	183, 409	934, 667	1, 089, 114	39, 492	222, 901	1, 132, 127

[1] Areas and volumes are assigned to States of principal forest locations. Minor areas and volumes in adjoining States are ignored.

[2] Includes material mainly of less than saw-log size.

[3] These totals include material in trees too small to produce boards but are shown converted to board feet at the rate of 1 cubic foot=5 board feet to provide comparative figures in units which are customarily used and understood.

TABLE 3.—*Volume and value of timber cut from National Forests, and area planted and seeded to trees, fiscal year 1962*

State and Commonwealth	Timber cut		Area planted and seeded to trees	
	Volume	Value	Fiscal year 1962	Total through June 30, 1962
	Thousand board feet	*Dollars*	*Acres*	*Acres*
Alabama	53, 986	1, 286, 613	5, 457	67, 334
Alaska	345, 558	919, 088	167	4, 425
Arizona	203, 962	1, 113, 505	1, 270	4, 561
Arkansas	163, 131	3, 815, 810	10, 969	43, 226
California	1, 336, 561	14, 460, 877	22, 988	134, 193
Colorado	124, 425	585, 152	4, 464	78, 070
Florida	67, 570	1, 162, 477	3, 330	54, 599
Georgia	42, 802	1, 043, 880	5, 411	41, 864
Idaho	687, 886	5, 518, 604	9, 803	131, 606
Illinois	4, 997	53, 019	356	46, 043
Indiana	3, 742	45, 832	1, 239	24, 028
Iowa				60
Kentucky	20, 464	327, 255	286	2, 020
Louisiana	52, 468	1, 084, 127	7, 630	146, 098
Maine	8, 575	106, 399		67
Michigan	124, 954	805, 493	16, 351	602, 917
Minnesota	121, 866	731, 974	6, 607	166, 942
Mississippi	134, 211	2, 707, 733	14, 218	207, 803
Missouri	28, 263	332, 563	2, 673	80, 786
Montana	561, 069	4, 183, 512	2, 970	57, 595
Nebraska	3	53	120	30, 335
Nevada	367	2, 296		506
New Hampshire	14, 196	235, 022	2	1, 172
New Mexico	86, 381	425, 597	696	4, 020
New York	98	435		42
North Carolina	39, 079	679, 693	3, 212	25, 810
North Dakota	38	397		967
Ohio	4, 292	38, 633	1, 081	19, 178
Oklahoma	9, 953	234, 976	540	7, 006
Oregon	2, 857, 988	59, 649, 761	46, 146	303, 341
Pennsylvania	24, 574	805, 844	216	19, 117
Puerto Rico	30	574		
South Carolina	78, 924	2, 160, 915	1, 442	22, 609
South Dakota	45, 933	296, 718	1, 104	40, 439
Tennessee	29, 114	422, 128	512	8, 692
Texas	95, 208	1, 942, 458	1, 424	54, 751
Utah	53, 852	299, 238	1, 557	5, 789
Vermont	8, 702	237, 705		1, 430
Virginia	37, 132	222, 687	538	6, 137
Washington	1, 400, 066	19, 810, 130	17, 219	219, 167
West Virginia	23, 583	408, 343	484	17, 487
Wisconsin	57, 816	427, 016	4, 963	236, 741
Wyoming	78, 418	320, 734	347	8, 760
Total	9, 032, 237	128, 905, 266	197, 792	2, 927, 733

TABLE 4.—*Number of livestock permitted to graze on the National Forests, National Grasslands, and land utilization projects, calendar year 1962*

NATIONAL FORESTS

State	Cattle, horses, and swine		Sheep and goats	
	Paid permits	Livestock permitted to graze	Paid permits	Livestock permitted to graze
	Number	*Number*	*Number*	*Number*
Alabama	43	546	0	0
Alaska	2	77	1	10
Arizona	846	147, 981	17	65, 142
Arkansas	104	1, 651	0	0
California	1, 098	104, 838	52	86, 645
Colorado	1, 575	149, 046	393	490, 481
Florida	30	1, 278	0	0
Georgia	42	705	0	0
Idaho	1, 766	115, 859	294	499, 716
Illinois	4	77	0	0
Indiana	2	6	0	0
Iowa	6	128	0	0
Louisiana	72	1, 434	0	0
Michigan	22	282	0	0
Minnesota	9	127	1	18
Mississippi	60	1, 170	0	0
Missouri	176	1, 754	0	0
Montana	1, 690	118, 235	105	146, 074
Nebraska	107	14, 309	0	0
Nevada	255	54, 903	41	109, 892
New Mexico	1, 702	85, 351	96	56, 824
North Carolina	6	42	0	0
Ohio	7	9	0	0
Oklahoma	9	336	0	0
Oregon	845	78, 270	74	97, 490
South Carolina	34	320	0	0
South Dakota	504	19, 569	12	7, 836
Tennessee	5	83	0	0
Texas	146	4, 014	0	0
Utah	2, 293	101, 587	559	407, 374
Vermont	5	47	0	0
Virginia	8	76	1	40
Washington	403	26, 239	20	21, 185
West Virginia	49	580	16	273
Wisconsin	8	189	0	0
Wyoming	1, 039	110, 005	184	331, 178
Total	14, 972	1, 141, 123	1, 866	2, 320, 178

NATIONAL FORESTS—Continued

State	Cattle, horses, and swine		Sheep and goats	
	Paid permits	Livestock permitted to graze	Paid permits	Livestock permitted to graze
	Number	*Number*	*Number*	*Number*

NATIONAL GRASSLANDS

Colorado	330	20, 032	0	0
Idaho	76	3, 603	0	0
Kansas	106	3, 508	0	0
Nebraska	45	4, 073	2	2, 540
New Mexico	93	4, 677	0	0
North Dakota	655	59, 614	13	3, 570
Oklahoma	121	2, 867	0	0
Oregon	59	2, 820	4	6, 020
South Dakota	499	40, 465	29	11, 272
Texas	159	5, 880	0	0
Wyoming	177	13, 945	65	23, 145
Total	2, 320	161, 484	113	46, 547

LAND UTILIZATION PROJECTS

California	19	674	0	0
Colorado	8	57	0	0
Iowa	1	41	0	32
Missouri	50	1, 105	0	0
New Mexico	35	785	0	0
New York	94	1, 425	2	101
South Dakota	7	562	0	0
Total	214	4, 649	2	133

TABLE 5.—*Estimated legal harvest of big-game animals* [1] *on National Forests and National Grasslands, fiscal year 1962*

State	Deer	Elk	Bear	Bighorn	Total big game [2]
	Number	*Number*	*Number*	*Number*	*Number*
Alabama	1, 100				1, 100
Alaska	12, 000	120	710	15	14, 000
Arizona	27, 000	500	130		30, 000
Arkansas	850				850
California	36, 000		880		37, 000
Colorado	79, 000	12, 000	600	45	92, 000
Florida	1, 300		25		1, 300
Georgia	1, 000				1, 000
Idaho	43, 000	13, 000	1, 800	100	59, 000
Illinois	1, 200				1, 200
Indiana	290				290
Kentucky	580				580
Louisiana	1, 400				1, 400
Maine	100		10		110
Michigan	13, 000		190		13, 000
Minnesota	13, 000		340		13, 000
Mississippi	2, 400				2, 400
Missouri	3, 400				3, 400
Montana	57, 000	12, 000	1, 300	100	73, 000
Nebraska	470				740
Nevada	14, 000	10			14, 000
New Hampshire	700		50		700
New Mexico	20, 000	640	190		21, 000
North Carolina	3, 300		140		3, 600
North Dakota	7, 200				8, 500
Oklahoma	100				100
Oregon	82, 000	8, 900	920		92, 000
Pennsylvania	4, 000		40		4, 000
South Carolina	340				340
South Dakota	7, 900				8, 800
Tennessee	600		15		690
Texas	560				560
Utah	96, 000	1, 100	40		97, 000
Vermont	530		30		560
Virginia	15, 000		180		15, 000
Washington	21, 000	4, 200	1, 600		27, 000
West Virginia	930		15		950
Wisconsin	4, 500		120		4, 600
Wyoming	37, 000	10, 000	290	110	53, 000

[1] Figures rounded in posting and totals.
[2] Also includes antelope, moose, mountain goat, peccary, and wild boar.

TABLE 6.—*Construction, reconstruction, and maintenance of National Forest (forest development) roads, bridges, and trails, fiscal year 1962*

State and Commonwealth	Roads		Bridges: construction, reconstruction, and replacement	Trails		Total obligations from all funds [1]
	Construction and reconstruction	Existing		Construction and reconstruction	Existing	
	Miles	*Miles*	*Number*	*Miles*	*Miles*	*Dollars*
Alabama		1,526.8	1			229,941
Alaska	5.9	258.4		7.0	479.6	1,391,856
Arizona	41.9	10,321.2	2	2.0	3,681.4	1,179,897
Arkansas	3.3	4,530.3				602,935
California	42.6	30,025.1	21	13.9	15,152.5	7,529,888
Colorado	62.8	14,797.6	18		9,319.0	2,170,785
Florida	14.1	1,461.8	4			277,786
Georgia	9.2	2,693.0			182.6	256,263
Idaho	99.6	16,268.5	46	43.6	19,894.0	4,735,505
Illinois	.2	1,066.8				102,398
Indiana		340.2				28,910
Kentucky	6.9	1,278.2			15.0	189,378
Louisiana	4.4	1,359.2	16			243,057
Maine		63.3			85.4	6,782
Michigan	25.1	5,750.3	2			756,040
Minnesota	14.6	2,939.9	3		467.6	1,047,533
Mississippi	1.8	2,550.9	2			398,710
Missouri	10.7	2,428.1				216,293
Montana	34.5	12,013.8	25	29.7	15,576.8	3,839,001
Nebraska	2.4	342.3		1.2		21,773
Nevada	6.2	2,985.0	4		1,929.6	242,232
New Hampshire	4.7	251.2	1		1,000.6	376,825
New Mexico	15.6	1,333.7	1	12.0	3,703.3	1,114,796
North Carolina	5.8	2,806.9	7		1,207.6	526,486
North Dakota		0.3				
Ohio		272.3				14,574
Oklahoma	1.0	478.9				33,283
Oregon	51.2	23,612.5	35	30.1	9,651.2	8,327,423
Pennsylvania	15.8	640.8	1		167.4	264,008
Puerto Rico		21.4			31.0	27,352
South Carolina	2.4	1,730.8	2			277,152
South Dakota	3.6	3,771.2	2		10.3	242,075
Tennessee	1.3	1,125.6			500.8	290,816
Texas	4.0	1,633.0	1			282,255
Utah	46.1	5,801.9	15	16.5	6,413.8	1,222,651
Vermont	3.9	260.3			185.1	216,174
Virginia	8.5	1,700.6	2		862.0	432,864
Washington	25.4	9,204.4	18	24.3	8,625.7	5,807,241
West Virginia	16.2	1,410.5	2		741.6	315,039
Wisconsin	9.6	2,407.2	3			547,868
Wyoming	9.4	6,602.6	13	.2	5,741.8	1,056,362
District of Columbia [2]						642,839
Total	610.7	186,066.8	247	180.5	105,625.7	47,430,342

[1] Total obligations are for construction, reconstruction, and maintenance.
[2] Administrative expenses.

TABLE 7.—*Use of recreation resources on the National Forests, calendar year 1962*

State and Commonwealth	Number of visits to—								
	Campgrounds	Picnic sites	Winter sports sites	Organization camps	Hotels or resorts	Recreation residences	Wilderness areas	Other forest areas	All facilities and areas
Alabama	33, 000	128, 100	0	1, 500	0	0	0	131, 000	293, 600
Alaska	23, 100	74, 500	35, 300	1, 500	82, 200	16, 400	0	777, 900	1, 010, 900
Arizona	796, 000	2, 047, 200	81, 000	48, 700	285, 200	75, 400	13, 400	2, 952, 900	6, 299, 800
Arkansas	80, 000	401, 700	0	5, 700	113, 600	10, 000	0	1, 422, 400	2, 033, 400
California	2, 657, 700	1, 709, 800	1, 389, 200	283, 200	1, 671, 500	557, 600	214, 300	7, 945, 700	16, 429, 000
Colorado	1, 510, 200	1, 380, 700	617, 800	19, 300	1, 047, 500	46, 500	42, 000	7, 656, 000	12, 320, 000
Florida	230, 000	687, 800	0	17, 900	1, 000	12, 300	0	792, 900	1, 741, 900
Georgia	117, 700	471, 100	0	2, 000	4, 500	2, 000	0	1, 111, 500	1, 708, 800
Idaho	685, 000	547, 900	241, 300	38, 600	129, 900	46, 200	51, 500	2, 373, 000	4, 113, 400
Illinois	1, 500	85, 700	0	0	0	0	0	241, 200	328, 400
Indiana	200	9, 100	0	0	0	0	0	129, 200	138, 500
Kansas	0	6, 000	0	0	0	0	0	3, 000	9, 000
Kentucky	19, 600	162, 600	0	2, 000	30, 800	1, 200	0	403, 300	619, 500
Louisiana	2, 500	220, 800	0	11, 900	85, 500	17, 400	0	142, 600	480, 700
Maine	1, 200	14, 200	0	200	0	0	0	27, 900	43, 500
Michigan	97, 000	197, 600	279, 100	5, 700	5, 900	10, 000	0	3, 546, 800	4, 142, 100
Minnesota	169, 700	73, 100	26, 800	8, 400	18, 000	12, 800	227, 500	1, 095, 500	1, 631, 800
Mississppi	4, 100	163, 500	0	10, 400	14, 200	0	0	478, 600	670, 800
Missouri	17, 400	141, 700	0	700	0	0	0	1, 074, 400	1, 234, 200
Montana	435, 300	511, 100	288, 700	19, 500	82, 900	69, 700	39, 600	5, 031, 600	6, 478, 400
Nebraska	2, 800	20, 200	0	2, 000	0	0	0	201, 000	226, 000
Nevada	153, 500	323, 200	39, 000	10, 800	0	2, 300	600	236, 600	766, 000
New Hampshire	90, 500	468, 000	214, 800	1, 200	81, 300	0	4, 800	2, 363, 700	3, 224, 300
New Mexico	465, 800	1, 375, 900	153, 900	25, 600	2, 600	16, 800	46, 100	1, 804, 700	3, 891, 400
North Carolina	139, 000	749, 300	0	11, 600	12, 000	3, 300	2, 000	2, 771, 600	3, 688, 800
North Dakota	600	3, 100	0	0	0	0	0	56, 400	60, 100
Ohio	8, 600	36, 600	0	0	0	0	0	92, 000	137, 200
Oklahoma	2, 300	70, 400	0	0	0	0	0	60, 900	133, 600
Oregon	1, 441, 700	1, 156, 300	531, 600	48, 300	1, 642, 300	45, 500	57, 600	3, 172, 200	8, 095, 500
Pennsylvania	42, 800	236, 700	0	17, 500	0	28, 300	0	1, 137, 800	1, 463, 100
South Carolina	10, 000	224, 300	0	0	0	0	0	424, 800	659, 100
South Dakota	476, 100	871, 500	3, 700	17, 900	18, 300	18, 000	0	1, 854, 100	3, 259, 600
Tennessee	215, 600	943, 400	0	18, 800	59, 200	23, 400	0	1, 073, 000	2, 333, 400
Texas	61, 100	244, 200	0	1, 300	200	0	0	462, 200	769, 000
Utah	1, 215, 100	3, 569, 900	590, 900	71, 800	79, 200	59, 300	46, 300	2, 593, 600	8, 226, 100
Vermont	4, 400	47, 000	400, 400	0	0	0	0	280, 600	732, 400
Virginia	52, 900	359, 000	0	5, 900	0	1, 000	0	2, 707, 100	3, 125, 900
Washington	986, 100	580, 600	562, 600	41, 100	381, 500	60, 500	23, 700	1, 549, 700	4, 185, 800
West Virginia	209, 300	264, 600	0	11, 000	0	0	0	698, 000	1, 182, 900
Wisconsin	49, 300	158, 200	25, 500	900	400	2, 600	0	440, 300	677, 200
Wyoming	432, 200	406, 400	94, 200	19, 100	221, 900	40, 300	45, 800	2, 650, 200	3, 910, 100
Puerto Rico	0	140, 600	0	8, 900	90, 000	5, 000	0	42, 500	287, 000
Total	12, 940, 900	21, 283, 600	5, 575, 800	790, 900	6, 161, 600	1, 183, 800	815, 200	64, 010, 400	112, 762, 200

TABLE 8.—*Recreation sites and capacities on the National Forests and National Grasslands as of June 30, 1962*

Type of facility	Sites classed according to number of annual visits						Area	Normal capacity (persons at one time)	Number of family units			
	Under 1,000	1,000 to 5,000	5,000 to 15, 000	15, 000 to 25, 000	Over 25,000	Total			Camping	Trailer	Picnicking	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Acres*	*Number*	*Number*	*Number*	*Number*	*Number*
Campground	2, 220	1, 293	507	114	87	4, 221	24, 330	231, 809	34, 211	4, 434	5, 212	43, 857
Picnic ground	368	431	269	89	107	1, 264	7, 413	81, 718	1, 243	157	13, 746	15, 146
Total	2, 588	1, 724	776	203	194	5, 485	31, 743	313, 527	34, 454	4, 591	18, 958	59, 003
Organization camp	246	251	56	2	1	556	7, 593	70, 128				
Hotel, lodge, and resort	118	152	91	24	33	418	3, 352	51, 040				
Other public service	56	40	33	10	20	159	869	17, 934				
Recreation residence	1, 201	251	64	11	4	1, 531	17, 630	102, 123	-------	-------	-------	[1] 18, 230
Swimming site	28	55	66	21	26	196	455	31, 719				
Boating site	154	141	78	10	8	391	660	30, 551				
Winter sports site	43	42	41	15	48	189	30, 901	209, 143				
Observation site	97	69	30	12	34	242	388	11, 918				
Total	4, 531	2, 725	1, 235	308	368	9, 167	93, 591	838, 083				

[1] Number of residences.

TABLE 9.—*Fires controlled by Forest Service fire organizations to protect National Forest lands, and area burned, calendar year 1962*

State	Fires						Area burned	
	Lightning	Smoking	Recreation	Incendiary	Other	Total	National Forest	Other ownership
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Acres*	*Acres*
Alabama	16	33	23	34	31	137	613	764
Alaska	0	1	11	0	9	21	4	0
Arizona	1, 554	84	89	2	69	1, 798	3, 329	50
Arkansas	53	33	31	62	56	235	1, 259	1, 740
California	1, 294	295	100	95	469	2, 253	23, 097	3, 613
Colorado	230	68	82	3	74	457	4, 132	577
Florida	116	31	13	24	40	224	2, 497	394
Georgia	12	15	7	15	20	69	182	56
Idaho	830	47	65	21	63	1, 026	4, 232	1, 338
Illinois	3	20	9	36	64	132	525	1, 004
Indiana	0	11	3	8	6	28	45	159
Kansas	0	0	0	0	1	1	0	0
Kentucky	2	15	5	17	22	61	179	139
Louisiana	6	22	10	78	21	137	1, 737	486
Maine	0	1	1	0	0	2	0	0
Michigan	3	38	18	7	70	136	177	228
Minnesota	3	11	12	4	17	47	58	15
Mississippi	15	59	34	145	68	321	2, 058	1, 040
Missouri	3	40	73	151	82	349	5, 113	2, 636
Montana	420	42	36	4	97	599	473	194
Nebraska	7	0	0	0	1	8	1, 068	0
Nevada	23	5	5	1	5	39	1, 410	1, 507
New Hampshire	3	3	0	0	2	8	4	1
New Mexico	654	32	40	6	28	760	3, 116	177
North Carolina	24	16	6	44	49	139	2, 869	1, 303
Ohio	0	20	9	40	30	99	224	355
Oklahoma	4	5	3	23	19	54	593	375
Oregon	448	99	138	14	173	872	1, 002	1, 187
Pennsylvania	0	5	6	0	7	18	100	0
South Carolina	7	26	7	48	47	135	546	357
South Dakota	57	3	5	0	23	88	32	4
Tennessee	12	11	9	27	22	81	177	303
Texas	10	33	20	22	36	121	524	176
Utah	154	44	36	15	55	304	744	593
Vermont	0	0	0	0	4	4	0	2
Virginia	10	26	15	14	35	100	249	374
Washington	246	44	62	0	86	438	1, 199	258
West Virginia	2	8	11	4	11	36	87	89
Wisconsin	0	8	1	1	11	21	3	21
Wyoming	80	16	27	1	12	136	241	44
Total	6, 301	1, 270	1, 022	966	1, 935	11, 494	63, 898	21, 559

TABLE 10.—*Forest fires on protected State and private lands, and area burned, calendar year 1962; and expenditures for control, fiscal year 1962* [1]

State	Area protected	Fires	Area burned	Prevention and suppression expenditures			
				Federal	State and county	Private [2]	Total
	Thousand acres	*Number*	*Acres*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Alabama	19, 990	7, 018	112, 300	398, 400	953, 784	146, 798	1, 498, 982
Alaska	3, 185	17	41	47, 000	54, 937	0	101, 937
Arkansas	16, 535	5, 056	207, 388	363, 500	1, 011, 043	84, 986	1, 459, 529
California	19, 810	2, 448	90, 229	1, 194, 000	16, 460, 329	0	17, 654, 329
Colorado	7, 407	578	17, 243	47, 000	134, 751	0	181, 751
Connecticut	1, 989	577	2, 818	56, 600	181, 922	0	238, 522
Delaware	453	58	124	11, 500	12, 539	0	24, 039
Florida	17, 388	8, 609	264, 660	604, 600	3, 143, 975	115, 912	3, 864, 487
Georgia	22, 081	8, 595	54, 460	581, 700	2, 968, 223	61, 383	3, 611, 306
Hawaii	1, 152	16	2, 340	25, 000	29, 552	0	54, 552
Idaho	7, 343	533	21, 333	195, 700	400, 382	102, 763	698, 845
Illinois	3, 170	378	10, 665	67, 900	122, 819	0	190, 719
Indiana	3, 926	333	11, 367	47, 000	76, 064	0	123, 064
Iowa	2, 277	6	23	35, 000	52, 902	0	87, 902
Kansas	20	----------	----------	3, 347	3, 347	0	6, 694
Kentucky	9, 854	3, 221	117, 326	183, 900	801, 654	0	985, 554
Louisiana	11, 899	8, 853	104, 795	459, 300	1, 876, 765	18, 782	2, 354, 847
Maine	16, 973	463	3, 438	334, 700	970, 227	0	1, 304, 927
Maryland	2, 850	593	2, 236	160, 800	475, 020	0	635, 820
Massachusetts	3, 252	5, 709	9, 092	136, 600	412, 308	0	548, 908
Michigan	17, 205	845	6, 486	506, 300	1, 924, 770	0	2, 431, 070
Minnesota	17, 771	477	22, 640	327, 100	559, 722	0	886, 822
Mississippi	14, 334	8, 563	108, 156	461, 600	1, 389, 387	0	1, 850, 987
Missouri	10, 746	3, 651	71, 463	277, 100	795, 163	0	1, 072, 263
Montana	6, 915	346	2, 222	144, 100	91, 899	227, 537	463, 536
Nebraska	1, 150	40	802	10, 000	4, 014	6, 808	20, 822
Nevada	2, 216	129	730	47, 000	170, 394	0	217, 394
New Hampshire	4, 182	563	2, 585	92, 400	176, 959	5, 614	274, 973
New Jersey	2, 095	1, 758	19, 512	139, 600	412, 575	0	552, 175
New Mexico	1, 918	103	280	47, 000	43, 476	17, 841	108, 317
New York	12, 995	1, 532	19, 549	312, 000	745, 108	0	1, 057, 108
North Carolina	17, 279	3, 200	51, 578	438, 200	1, 631, 065	32, 080	2, 101, 345
North Dakota	116	4	310	7, 520	7, 520	0	15, 040
Ohio	3, 923	1, 454	8, 975	123, 500	313, 858	0	437, 358
Oklahoma	4, 488	640	58, 677	157, 300	182, 929	18, 896	359, 125
Oregon	12, 141	851	8, 874	580, 600	2, 476, 117	393, 880	3, 450, 597
Pennsylvania	14, 704	1, 769	44, 520	255, 900	822, 386	0	1, 078, 286
Rhode Island	434	117	2, 431	47, 000	124, 920	0	171, 920
South Carolina	11, 175	3, 910	43, 986	394, 100	1, 262, 346	0	1, 656, 446
South Dakota	2, 827	50	78	47, 000	51, 406	0	98, 406
Tennessee	10, 119	3, 127	27, 341	345, 000	1, 025, 508	5, 463	1, 375, 971
Texas	14, 884	2, 639	45, 683	307, 200	698, 810	101, 050	1, 107, 060
Utah	5, 903	326	10, 162	47, 000	87, 373	0	134, 373
Vermont	3, 517	206	399	47, 000	47, 431	0	94, 431
Virginia	14, 033	1, 612	8, 753	348, 800	1, 044, 433	5, 612	1, 398, 845
Washington	12, 280	831	2, 124	578, 500	2, 937, 842	100, 000	3, 616, 342
West Virginia	9, 007	1, 624	40, 815	160, 380	421, 164	0	581, 544
Wisconsin	15, 297	1, 029	4, 370	444, 700	1, 575, 450	0	2, 020, 150
Wyoming	3, 275	30	91	27, 000	27, 477	0	54, 477
Total	418, 483	94, 487	1, 645, 470	11, 674, 447	51, 194, 045	1, 445, 405	64, 313, 897

[1] Table does not include 10,489 fires and 2,163,075 acres burned on 24,447 million acres of unprotected lands.
[2] Private expenditures, spent under direct supervision of State Foresters, as part of the Clarke-McNary program.

TABLE 11.—*Distribution of forest and windbarrier planting stock by cooperating States, fiscal year 1962 (under Clarke-McNary program)*

State and Commonwealth	Expenditures derived from—				Trees distributed (F.Y. 1962)
	Federal allotment	State appropriation	Receipts	All sources	
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Thousands*
Alabama	0	0	196, 659	196, 659	57, 680
Arkansas	4, 200	33, 599	67, 416	105, 215	16, 669
California	4, 200	64, 157	23, 298	91, 655	2, 654
Colorado	5, 800	7, 631	35, 659	49, 090	528
Connecticut	4, 200	7, 202	34, 229	45, 631	1, 391
Delaware	4, 200	13, 433	0	17, 633	759
Florida	0	0	297, 776	297, 776	64, 864
Georgia	4, 200	232, 764	222, 580	459, 544	53, 468
Hawaii	4, 200	101, 121	0	105, 321	1, 064
Idaho	4, 200	14, 404	18, 490	37, 094	744
Illinois	4, 200	27, 493	76, 799	108, 492	4, 580
Indiana	4, 200	40, 374	63, 044	107, 618	4, 682
Iowa	0	0	51, 826	51, 826	1, 143
Kansas	4, 017	4, 017	46, 505	54, 539	1, 083
Kentucky	4, 200	111, 053	128, 244	243, 497	15, 306
Louisiana	4, 200	169, 146	158, 323	331, 669	42, 597
Maine	4, 200	46, 714	30, 216	81, 130	2, 076
Maryland	4, 200	34, 412	10, 050	48, 662	4, 999
Massachusetts	4, 200	40, 948	13, 058	58, 206	919
Michigan	4, 200	50, 242	87, 759	142, 201	28, 290
Minnesota	4, 200	274, 471	105, 968	384, 639	36, 881
Mississippi	4, 200	62, 708	192, 918	259, 826	46, 637
Missouri	4, 200	94, 616	30, 346	129, 162	4, 563
Montana	4, 200	10, 937	40, 925	56, 062	978
Nebraska	0	0	96, 516	96, 516	2, 166
Nevada	4, 200	6, 207	5, 234	15, 641	70
New Hampshire	4, 200	28, 536	14, 060	46, 796	1, 306
New Jersey	4, 200	12, 991	10, 451	27, 642	629
New Mexico	4, 200	4, 365	4, 085	12, 650	118
New York	4, 200	268, 968	150, 020	423, 188	21, 252
North Carolina	4, 200	26, 696	205, 422	236, 318	32, 411
North Dakota	4, 200	38, 865	31, 429	74, 494	1, 622
Ohio	4, 200	114, 422	120, 161	238, 783	12, 356
Oklahoma	8, 737	23, 238	9, 796	41, 771	1, 792
Oregon	4, 200	53, 140	93, 340	150, 681	7, 856
Pennsylvania	4, 200	193, 112	59, 235	256, 547	12, 539
Puerto Rico	4, 700	55, 516	0	60, 216	1, 314
Rhode Island	4, 200	4, 365	3, 042	11, 607	269
South Carolina	4, 200	65, 422	227, 069	296, 690	70, 028
South Dakota	7, 901	8, 232	49, 883	66, 016	1, 422
Tennessee	4, 200	7, 610	89, 026	100, 836	28, 303
Texas	4, 200	17, 845	59, 668	81, 713	12, 093
Utah	1, 979	1, 979	8, 626	12, 584	121
Vermont	4, 200	57, 709	28, 890	90, 798	2, 901
Virginia	4, 200	24, 674	154, 606	183, 479	30, 499
Washington	4, 200	9, 317	126, 924	140, 441	9, 316
West Virginia	4, 200	81, 914	60, 237	146, 351	4, 518
Wisconsin	4, 200	252, 365	205, 004	461, 569	30, 350
Wyoming	2, 325	2, 325	6, 508	11, 160	162
Total	195, 059	2, 801, 255	3, 751, 320	6, 747, 634	679, 968

TABLE 12.—*Planting stock available for forest and windbarrier planting on State and private lands, area planted or seeded, and acreage in need of planting*

State and Commonwealth	Planting stock shipped, fiscal year 1962			Area planted or seeded F.Y. 1962 [1]	Plantable area as of Jan. 1, 1953 [2]	Planting needs, 1958 [3]
	State nurseries	Other	Total			
	Thousands	*Thousands*	*Thousands*	*Acres*	*Acres*	*Acres*
Alabama	67, 781	10, 438	78, 219	97, 257	1, 675, 000	5, 006, 000
Alaska	0	0	0	0	----------	----------
Arizona	0	0	0	0	18, 000	40, 000
Arkansas	16, 660	0	16, 660	21, 025	1, 408, 000	1, 405, 000
California	3, 089	764	3, 853	8, 444	3, 357, 000	3, 001, 000
Colorado	225	344	569	1, 469	295, 000	318, 000
Connecticut	1, 771	100	1, 871	1, 332	205, 000	111, 000
Delaware	759	0	759	656	34, 000	11, 000
Florida	74, 017	25, 669	99, 686	142, 139	4, 859, 000	7, 033, 000
Georgia	47, 818	56, 330	104, 148	63, 300	1, 566, 000	6, 344, 000
Hawaii	1, 064	0	1, 064	1, 822	----------	810, 000
Idaho	650	134	784	2, 386	265, 000	691, 000
Illinois	6, 599	0	6, 599	4, 580	2, 856, 000	904, 000
Indiana	3, 557	1, 435	4, 992	4, 141	1, 290, 000	330, 000
Iowa	918	352	1, 270	1, 483	613, 000	264, 000
Kansas	0	2, 434	2, 434	2, 304	915, 000	230, 000
Kentucky	16, 192	753	16, 945	17, 605	1, 500, 000	2, 004, 000
Louisiana	43, 085	10, 040	53, 125	81, 565	1, 139, 000	2, 379, 000
Maine	5, 742	2, 219	7, 961	6, 326	472, 000	1, 171, 000
Maryland	4, 886	113	4, 999	5, 466	250, 000	455, 000
Massachusetts	919	0	919	1, 255	114, 000	254, 000
Michigan	19, 830	29, 328	49, 158	25, 778	2, 905, 000	1, 424, 000
Minnesota	36, 880	2, 171	39, 051	37, 137	2, 410, 000	5, 427, 000
Mississippi	53, 575	35, 565	89, 140	92, 306	4, 187, 000	2, 255, 000
Missouri	6, 964	1	6, 965	5, 225	1, 267, 000	3, 200, 000
Montana	1, 302	558	1, 860	2, 829	214, 000	931, 000
Nebraska	0	5, 315	5, 315	5, 550	968, 000	87, 000
Nevada	63	10	73	100	28, 000	30, 000
New Hampshire	2, 104	0	2, 104	1, 306	309, 000	464, 000
New Jersey	753	140	893	629	93, 000	819, 000
New Mexico	0	118	118	429	97, 000	245, 000
New York	24, 100	826	24, 926	22, 450	1, 250, 000	1, 378, 000
North Carolina	43, 721	12, 000	55, 721	46, 893	898, 000	2, 841, 000
North Dakota	2, 155	7, 871	10, 026	11, 030	742, 000	231, 000
Ohio	14, 614	3, 290	17, 904	13, 963	729, 000	616, 000
Oklahoma	1, 966	0	1, 966	1, 891	876, 000	1, 054, 000
Oregon	11, 174	3, 016	14, 190	79, 125	969, 000	2, 008, 000
Pennsylvania	13, 457	35, 734	49, 191	39, 200	1, 080, 000	869, 000
Puerto Rico	1, 341	0	1, 341	1, 772	----------	105, 000
Rhode Island	0	269	269	301	39, 000	85, 000
South Carolina	71, 892	3, 766	75, 658	83, 189	1, 169, 000	2, 269, 000
South Dakota	528	3, 548	4, 076	7, 462	702, 000	129, 000
Tennessee	22, 546	29, 418	51, 964	39, 923	1, 465, 000	1, 181, 000
Texas	11, 967	15, 612	27, 579	26, 836	539, 000	2, 235, 000
Utah	139	30	169	203	37, 000	46, 000
Vermont	2, 901	0	2, 901	2, 907	99, 000	274, 000
Virginia	29, 423	9, 301	38, 724	44, 778	1, 799, 000	880, 000
Washington	14, 421	7, 245	21, 666	50, 778	751, 000	1, 136, 000
West Virginia	5, 094	595	5, 689	5, 122	989, 000	567, 000
Wisconsin	34, 102	7, 055	41, 157	37, 961	2, 685, 000	5, 172, 000
Wyoming	0	164	164	464	95, 000	103, 000
Total	722, 744	323, 971	1, 046, 715	1, 152, 092	52, 222, 000	70, 822, 000

[1] Includes 159,738 acres directly seeded, primarily in Alabama, Florida, Louisiana, Oregon, and Washington. By estimate, 80 percent of these plantings and seedings are successful.

[2] Figures are those reported in "Timber Resources for America's Future." Alaska, Hawaii, and Puerto Rico were not included in the timber resource study.

[3] Figures are those reported in the National Inventory of Soil and Water Conservation Needs, 1962.

TABLE 13.—*Cooperative forest management accomplishments and expenditures, fiscal year 1962*

(U.S. Forest Service and State Foresters cooperating in 540 projects)

State and Commonwealth	Accomplishments				Expenditures		
	Woodland owners assisted	Woodland involved	Products harvested	Gross sale value	Federal	State	Total
	Number	*Acres*	*M bd. ft.*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Alabama	772	69, 797	10, 563	184, 010	34, 264	34, 264	68, 528
Alaska	2	800	0	11, 400	6, 421	6, 421	12, 842
Arkansas	1, 187	63, 074	2, 996	60, 610	34, 082	34, 082	68, 164
California	1, 759	345, 948	59, 678	1, 065, 085	41, 890	58, 430	100, 320
Colorado	150	26, 013	185	20, 706	18, 400	18, 784	37, 184
Connecticut	1, 759	25, 083	1, 813	42, 155	23, 553	27, 822	51, 375
Delaware	61	1, 859	685	19, 580	4, 096	4, 096	8, 192
Florida	4, 223	1, 283, 531	22, 338	723, 832	108, 740	191, 268	300, 008
Georgia	3, 643	264, 757	16, 499	377, 343	104, 530	124, 106	228, 636
Idaho	388	24, 405	1, 298	18, 919	10, 962	10, 963	21, 925
Illinois	1, 487	39, 331	2, 860	128, 281	54, 750	58, 331	113, 081
Indiana	1, 538	51, 552	5, 657	199, 692	30, 000	30, 903	60, 903
Iowa	1, 403	15, 268	416	31, 253	22, 020	41, 965	63, 985
Kansas	241	4, 134	691	24, 254	20, 970	20, 970	41, 940
Kentucky	4, 608	79, 673	4, 510	122, 458	79, 970	194, 084	274, 054
Louisiana	307	34, 206	2, 568	37, 443	38, 540	48, 774	87, 314
Maine	1, 363	67, 237	20, 533	294, 096	65, 090	75, 704	140, 794
Maryland	1, 578	22, 069	5, 422	148, 723	46, 450	61, 421	107, 871
Massachusetts	2, 463	52, 202	22, 223	482, 337	23, 000	25, 079	48, 079
Michigan	3, 123	80, 312	12, 378	271, 221	78, 940	136, 071	215, 011
Minnesota	4, 845	41, 355	5, 083	206, 644	44, 920	59, 919	104, 839
Mississippi	1, 143	121, 395	3, 095	73, 920	46, 360	59, 907	106, 267
Missouri	1, 609	178, 090	7, 315	181, 270	79, 860	105, 023	184, 883
Montana	239	18, 632	648	11, 058	16, 091	16, 091	32, 182
Nebraska	346	3, 562	694	23, 442	12, 000	13, 842	25, 842
Nevada	80	243	500	17, 538	8, 915	8, 915	17, 830
New Hampshire	3, 082	126, 696	7, 117	185, 347	35, 060	41, 562	76, 622
New Jersey	851	24, 199	3, 495	84, 143	30, 410	38, 020	68, 430
New Mexico	71	52, 841	16, 877	171, 847	20, 000	21, 298	41, 298
New York	5, 662	204, 793	38, 889	882, 872	131, 696	131, 697	263, 393
North Carolina	4, 482	102, 199	19, 566	544, 711	92, 970	201, 163	294, 133
North Dakota	148	14, 254	188	12, 227	19, 008	19, 008	38, 016
Ohio	2, 706	63, 738	7, 454	249, 556	74, 600	80, 161	154, 761
Oklahoma	520	19, 494	290	6, 453	9, 832	9, 833	19, 665
Oregon	1, 940	95, 026	6, 437	233, 833	33, 189	33, 189	66, 378
Pennsylvania	2, 502	41, 970	6, 618	170, 204	96, 370	114, 180	210, 550
Rhode Island	257	6, 441	1, 397	5, 938	7, 183	7, 713	14, 896
South Carolina	3, 428	319, 613	18, 649	467, 297	68, 515	94, 622	163, 137
South Dakota	194	17, 322	2, 204	11, 730	15, 258	15, 258	30, 516
Tennessee	1, 153	106, 373	6, 190	103, 841	53, 640	67, 461	121, 101
Texas	648	121, 418	5, 923	9, 834	37, 780	43, 853	81, 633
Utah	46	1, 678	316	4, 985	6, 993	6, 993	13, 986
Vermont	3, 294	56, 494	10, 416	372, 788	54, 750	82, 960	137, 710
Virginia	5, 074	229, 266	157, 015	3, 309, 652	147, 860	197, 917	345, 777
Washington	2, 330	69, 897	8, 436	188, 775	40, 003	43, 497	83, 500
West Virginia	3, 088	52, 558	4, 019	91, 176	51, 770	80, 496	132, 266
Wisconsin	8, 137	155, 527	15, 613	456, 863	170, 950	221, 467	392, 417
Wyoming	0	0	0	0	1, 235	1, 235	2, 470
Total, U.S.	89, 930	4, 796, 325	547, 757	12, 341, 342	2, 253, 886	3, 020, 818	5, 274, 704
Puerto Rico	1, 488	781	30	3, 000	13, 738	13, 738	27, 476
Grand total	91, 418	4, 797, 106	547, 787	12, 344, 342	2, 267, 624	3, 034, 556	5, 302, 180

TABLE 14.—*Pest control accomplishments and costs, calendar year 1962*

OAK WILT CONTROL

Ownership or management	Area surveyed	Trees treated	Funds expended		
			Federal	State	Total
	Thousand acres	*Number*	*Dollars*	*Dollars*	*Dollars*
National Forest:					
Cumberland	51	14	226	0	226
Jefferson	250	1	476	0	476
George Washington	904	66	2, 486	0	2, 486
Ozark	100	0	990	0	990
Subtotal	1, 305	81	4, 178	----------	4, 178
State and Private:					
Arkansas	8, 000	559	2, 639	5, 278	7, 917
Kentucky	7, 100	530	15, 086	43, 036	58, 122
North Carolina	2, 650	32	2, 500	5, 000	7, 500
Pennsylvania	10, 000	867	11, 526	34, 608	46, 134
Virginia	4, 980	67	1, 982	5, 949	7, 931
West Virginia	9, 900	2, 253	20, 298	96, 472	116, 770
Subtotal	42, 630	4, 308	54, 031	190, 343	244, 374
Grand total	43, 935	4, 389	58, 209	190, 343	248, 552

BLISTER RUST CONTROL

Ownership or management	Control by ribes eradication						Control with antibiotics		
	Premaintenance work		Maintenance work		Ribes eradicated	Control established	Surveyed [2]	Acres treated	Trees treated
	Surveyed [1]	Treated	Surveyed [1]	Treated					
	Acres	*Acres*	*Acres*	*Acres*	*Number*	*Acres*	*Acres*	*Acres*	*Number*
Federal:									
USDA, Forest Service	119, 342	32, 285	161, 698	6, 658	4, 672, 000	15, 890	602, 625	77, 613	11, 301, 358
Department of the Interior:									
National Parks	34, 312	9, 967	17, 615	5, 093	285, 000	7, 568	4, 140	2, 894	255, 662
Bureau of Land Management	7, 894	545	7, 025	15	83, 000	2, 517	--------	42	5, 796
Indian Reservations	1, 613	216	24, 470	1, 765	198, 000	553	--------	--------	----------
Subtotal, USDI	43, 819	10, 728	49, 110	6, 873	566, 000	10, 638	4, 140	2, 936	261, 458
Total Federal	163, 161	43, 013	210, 808	13, 531	5, 238, 000	26, 528	606, 765	80, 549	11, 562, 816
Non-Federal	432, 806	92, 992	1, 443, 012	42, 397	3, 412, 000	78, 961	344, 960	14, 810	1, 405, 900
Grand Total	595, 967	136, 005	1, 653, 820	55, 928	8, 650, 000	105, 489	951, 725	95, 359	12, 968, 716

[1] Systematically inspected to locate area in need of treatment and to determine effectiveness of control.
[2] Inspected to determine where antibiotic treatment is feasible and justified from the cost-benefit standpoint.

TABLE 14.—*Pest control accomplishments and costs, calendar year 1962*—Continued

INSECTS

Ownership or management	Bark beetles		Defoliators		Other insects		Costs for all insects [4]
	Trees treated [3]	Control costs	Area treated	Control costs	Area treated	Control costs	
	Number	*Dollars*	*Acres*	*Dollars*	*Acres*	*Dollars*	*Dollars*
National Forest	1, 163, 112	3, 738, 597	1, 042, 594	1, 046, 501	2, 853	4, 413	[5] 4, 789, 511
State and private	734, 251	838, 255	147, 666	113, 273	278	3, 524	955, 052
Total	1, 897, 363	4, 576, 852	1, 190, 260	1, 159, 774	3, 131	7, 937	5, 744, 563

[3] Includes infested trees, stumps, and cull logs.
[4] Exclusive of administrative and survey expenditures.
[5] Includes the Federal share of control costs on non-Federal lands.

TABLE 15.—*Statement of Forest Service receipts and expenditures, all programs and sources, fiscal year 1962*

Item	Receipts	Expenditures
National Forest programs:		
Cash receipts and appropriation expenditures	$140, 127, 353	$226, 176, 988
Cash receipts from National Forest land collected by and deposited to accounts of other agencies (Fed. Power Comm.; Dept. of Interior)	11, 476, 000	----------
Noncash income and expense (roads built by timber purchasers)	48, 896, 625	48, 896, 625
Total	200, 499, 978	275, 073, 613
Forest research programs:		
Forest research appropriations	----------	23, 715, 665
Cooperative research work	1, 018, 633	967, 167
Total	1, 018, 633	24, 682, 832
State and private forestry programs:		
Fire protection, tree distribution, and forest management cooperation	----------	15, 725, 235
Soil bank program	----------	56, 876
Assistance to States for tree planting	----------	992, 514
Great Plains conservation program	----------	16, 746
Insect and disease control	----------	1, 443, 003
Flood prevention and watershed protection	----------	1, 537, 587
Forest fire prevention, "Smokey Bear"	19, 604	24, 964
Cooperator funds	1, 966, 422	1, 941, 976
Total	1, 986, 026	21, 738, 901
Work for other Government agencies and non-Government persons and firms:		
Insect and disease control (Interior Department lands)	----------	129, 999
Miscellaneous work for other Government agencies	2, 926, 683	4, 340, 313
Work performed for non-Government persons, firms, etc.—cooperative work	2, 883, 806	2, 849, 741
Reimbursed	1, 012, 594	1, 012, 594
Total	6, 823, 083	8, 332, 647
Total receipts and expenditures	210, 327, 720	329, 827, 993
Cash receipts distributed to States, counties, and Puerto Rico as directed by Congress (receipts of F.Y. 1961 except as indicated):		
Payments to States and Puerto Rico (Act 5/23/08), National Forest Fund	----------	[1] 25, 056, 348
Payments to school funds, Arizona and New Mexico (Act 6/20/10), National Forest Fund	----------	99, 211
Payment to Minnesota (Cook, Lake, and St. Louis Counties) (Superior N.F.) (Act 6/22/48), National Forest Fund	----------	123, 550
Payment to counties—National Grasslands and land utilization areas (Act 7/22/37) (receipts of C.Y. 1961)	----------	420, 714
Total	----------	25, 699, 823
Internal equipment and supply services (Working Capital Fund): Financed primarily by charges included above to Forest Service programs	25, 941, 430	26, 986, 883

[1] Does not include approximately $3,052,071 due counties from F.Y. 1961 receipts on National Forest O&C lands. This amount was included in total receipts of $4,069,428 transferred to Interior for distribution under act of Aug. 28, 1937 (50 Stat. 874), as amended.

NOTE: Expenditures are on an obligation basis except Working Capital Fund, which is on accrual basis.

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